City of Canby Addendum to the Clackamas County Multi-Jurisdictional Hazard Mitigation Plan

Photo Credit: City of Canby

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Volume II: Canby Addendum

Prepared for:

City of Canby

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Purpose

This is an update of the Canby addendum to the Clackamas County Multi-Jurisdictional Natural Hazard Mitigation Plan (NHMP). This addendum supplements information contained in Volume I (Basic Plan) which serves as the NHMP foundation and Volume III (Appendices) which provide additional information. This addendum meets the following requirements:

- Multi-Jurisdictional **Plan Adoption** §201.6(c)(5),
- Multi-Jurisdictional **Participation** §201.6(a)(3),
- Multi-Jurisdictional **Mitigation Strategy** §201.6(c)(3)(iv) and
- Multi-Jurisdictional **Risk Assessment** §201.6(c)(2)(iii).

Updates to Canby's addendum are further discussed throughout the NHMP and within Volume III, Appendix B, which provides an overview of alterations to the document that took place during the update process.

Canby adopted their addendum to the Clackamas County Multi-jurisdictional NHMP on **[Month] [Day]. 2019.** FEMA Region X approved the Clackamas County NHMP on April 12, 2019 and the City's addendum on **[Month] [Day], 2019.** With approval of this NHMP the City is now eligible to apply for the Robert T. Stafford Disaster Relief and Emergency Assistance Act's hazard mitigation project grants through **April 11, 2024.**

Mitigation Plan Mission

The NHMP mission states the purpose and defines the primary functions of the NHMP. It is intended to be adaptable to any future changes made to the NHMP and need not change unless the community's environment or priorities change.

The City concurs with the mission statement developed during the Clackamas County planning process (Volume I, Section 3):

> ***Promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property, and the environment from natural hazards.***

This can be achieved by increasing public awareness, documenting the resources for risk reduction and loss-prevention, and identifying activities to guide the county towards building a safer, more sustainable community.

Mitigation Plan Goals

Mitigation plan goals are more specific statements of direction that Clackamas County citizens and public and private partners can take while working to reduce the City's risk from natural hazards. These statements of direction form a bridge between the broad mission statement and action items. The goals listed here serve as checkpoints as agencies and organizations begin implementing mitigation action items.

The City concurs with the goals developed during the Clackamas County planning process (Volume I, Section 3). All NHMP goals are important and are listed below in no order of priority. Establishing community priorities within action items neither negates nor eliminates any goals, but it establishes which action items to consider implementing first, should funding become available.

Below is a list of the NHMP goals:

GOAL #1: PROTECT LIFE AND PROPERTY

- Implement activities that assist in protecting lives by making homes, businesses, infrastructure, critical facilities, and other property more resistant to natural hazards.
- Reduce losses and repetitive damages for chronic hazard events while promoting insurance coverage for catastrophic hazards.
- Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventative measures for existing development in areas vulnerable to natural hazards.

GOAL #2: ENHANCE NATURAL SYSTEMS

- Balance watershed planning, natural resource management, and land use planning with natural hazards mitigation to protect life, property, and the environment.
- Preserve, rehabilitate, and enhance natural systems to serve natural hazard mitigation functions.

GOAL #3: AUGMENT EMERGENCY SERVICES

- Establish policy to ensure mitigation projects for critical facilities, services, and infrastructure.
- Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, and business, and industry.
- Coordinate and integrate natural hazards mitigation activities, where appropriate, with emergency operations plans and procedures.

GOAL #4: ENCOURAGE PARTNERSHIPS FOR IMPLEMENTATION

- Strengthen communication and coordinate participation among and within public agencies, citizens, non-profit organizations, business, and industry to gain a vested interest in implementation.
- Encourage leadership within public and private sector organizations to prioritize and implement local, county, and regional hazard mitigation activities.

GOAL #5: PROMOTE PUBLIC AWARENESS

- Develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards.
- Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

NHMP Process, Participation and Adoption

This section of the NHMP addendum addresses 44 CFR 201.6(c)(5), *Plan Adoption*, and 44 CFR 201.6(a)(3), *Participation.*

Canby first developed an addendum to Clackamas County's Natural Hazards Mitigation Plan in 2003. This plan was updated in 2009, 2013, and in 2018. The last update of the Canby addendum to the Clackamas County NHMP was approved by FEMA on April 8, 2013.

In addition to establishing a comprehensive community-level mitigation strategy, the Disaster Mitigation Act of 2000 (DMA2K), and the regulations contained in 44 CFR 201, require that jurisdictions maintain an approved NHMP to receive federal funds for mitigation projects. Local adoption, and federal approval of this NHMP ensures that the city will remain eligible for pre-, and post-disaster mitigation project grants.

The Oregon Partnership for Disaster Resilience (OPDR) at the University of Oregon's Institute for Policy Research, and Engagement (IPRE) collaborated with the Oregon Office of Emergency Management (OEM), Clackamas County, and Canby to update their NHMP. This project is funded through the Federal Emergency Management Agency's (FEMA) Fiscal-Year 2016 (FY16) Pre-Disaster Mitigation (PDM) Competitive Grant Program EMS-2017-PC-0005 (PDMC-PL-10-OR-2016-001). Members of the Canby NHMP Hazard Mitigation Advisory Committee (HMAC) also participated in the County NHMP update process (Volume III, Appendix B).

The Clackamas County NHMP, and Canby addendum, are the result of a collaborative effort between citizens, public agencies, non-profit organizations, the private sector, and regional organizations. The Canby HMAC guided the process of developing the NHMP.

Convener

The Canby Public Works Director serves as the NHMP addendum convener. The convener of the NHMP will take the lead in implementing, maintaining and updating the addendum to the Clackamas County NHMP in collaboration with the designated convener of the Clackamas County NHMP (Clackamas County Resilience Coordinator).

Representatives from the City of Canby HMAC met formally and informally, to discuss updates to their addendum (Volume III, Appendix B). The HMAC reviewed and revised the City's addendum, with focus on the NHMP's risk assessment and mitigation strategy (action items).

This addendum reflects decisions made at the designated meetings and during subsequent work and communication with Clackamas County Resilience Coordinator, and the OPDR. The changes are highlighted with more detail throughout this document and within Volume III, Appendix B. Other documented changes include a revision of the City's risk assessment and hazard identification sections, NHMP mission and goals, action items, and community profile.

The Canby HMAC was comprised of the following representatives:

- Convener, Jennifer Cline, Public Works Director (former)
- Rick Robinson, City Administrator

- Jerry Nelzen, Public Works Operations
- Amanda Zeiber, Technical Services
- Dave Conner, Wastewater Treatment
- Jorge Tro, Canby Police Department
- Todd Gary, Canby Fire
- Jim Stewart, Canby Utility

Public participation was achieved with the establishment of the HMAC, which was comprised of City officials representing different departments and sectors. The HMAC served as the local review body for the NHMP's development. Community members were provided an opportunity for comment via the NHMP review process, and through a survey administered by Clackamas County (Volume III, Appendix G).

NHMP Implementation and Maintenance

The City Council will be responsible for adopting the Canby addendum to the Clackamas County NHMP. This addendum designates a HMAC and a convener to oversee the development and implementation of action items. Because the City addendum is part of the County's multi-jurisdictional NHMP, the City will look for opportunities to partner with the County. The City's HMAC will convene after re-adoption of the Canby NHMP addendum on an annual schedule. The County is meeting on a semi-annual basis and will provide opportunities for the cities to report on NHMP implementation and maintenance during their meetings. The City's Public Works Director will serve as the convener and will be responsible for assembling the HMAC. The HMAC will be responsible for:

- Reviewing existing action items to determine suitability of funding;
- Reviewing existing and new risk assessment data to identify issues that may not have been identified at NHMP creation;
- Educating and training new HMAC members on the NHMP and mitigation actions in general;
- Assisting in the development of funding proposals for priority action items;
- Discussing methods for continued public involvement; and
- Documenting successes and lessons learned during the year.

The convener will also remain active in the County's implementation and maintenance process (Volume I, Section 4).

The City will utilize the same action item prioritization process as the County (Volume I, Section 4).

Implementation through Existing Programs

This NHMP is strategic and non-regulatory in nature, meaning that it does not necessarily set forth any new policy. It does, however, provide: (1) a foundation for coordination and collaboration among agencies and the public in the city; (2) identification and prioritization of future mitigation activities; and (3) aid in meeting federal planning requirements and qualifying for assistance programs. The mitigation plan works in conjunction with other city plans and programs including the Comprehensive Land Use Plan, Capital Improvements Plan, and Building Codes, as well as the Clackamas County NHMP, and the State of Oregon NHMP.

The mitigation actions described herein (and in Attachment A) are intended to be implemented through existing plans and programs within the city. Plans and policies already in existence have support from residents, businesses and policy makers. Where possible, Canby will implement the NHMP's recommended actions through existing plans and policies. Many land-use, comprehensive and strategic plans get updated regularly, allowing them to adapt to changing conditions and needs. Implementing the NHMP's action items through such plans and policies increases their likelihood of being supported and implemented. Implementation opportunities are further defined in action items when applicable.

Canby's acknowledged comprehensive plan is the City of Canby Comprehensive Plan (1984, updated in January 2007). The City implements the plan through the Development Code.

Canby currently has the following plans, regulations, and projects that relate to natural hazard mitigation. For a complete list visit the City's website:

- Comprehensive Plan
  - Land Use Map (May 2014)
  - Additional Planning Documents
- Municipal Code
  - Title 08: Health and Safety
  - Title 13: Public Services
  - Title 15: Buildings and Construction
    - Chapter 15.12: Flood Hazard Protection
  - Title 16: Planning and Zoning
    - Chapter 16.40: Hazard Overlay Zone
- Capital Improvement Plan
- Transportation Systems Plan
- Stormwater Master Plan
- Water System Master Plan
- General City Maps

Other plans:

- Clackamas Community Wildfire Protection Plan
  - Canby Rural Fire Protection District #62

Government Structure

The City of Canby has a council-mayor form of government. The City Council consists of seven members; a mayor and six councilors. The mayor presides over Council meetings. The mayor is elected to a two-year term, while City Council members are elected to four-year terms of office through a general election. The City Council is responsible for identifying problems and needs within the community and then addressing those problems through community goals and objectives.

The City of Canby currently has the following departments which have a role in natural hazard mitigation:

Administration Department is responsible for taking charge of the daily supervision of City affairs.

Development Services includes economic development, planning and building, and urban renewal.

The **Planning Department** regulates growth and development in the city of Canby by administering the city's Comprehensive Plan and Municipal Code related to zoning and land division. Tasks range from implementing existing zoning regulations to assisting City Council with land use and growth planning policy development. Planning is also responsible for providing safe, attractive, and well-maintained parks, facilities, trails, open spaces, and recreation programs. Building permits are issued by Clackamas County after City review.

The **Public Works Department** provides many of the basic urban services to the citizens of Canby including parks, streets (including street lighting), sewer, street trees, waste water treatment plant, building maintenance, and fleet services. Canby Utility (a city owned utility) provides water and electric for the City.

Police services are provided by the **Police Department**. Fire services are provided by **Canby Rural Fire Protection District #62**.

Continued Public Participation

An open public involvement process is essential to the development of an effective NHMP. To develop a comprehensive approach to reducing the effects of natural disasters, the planning process shall include opportunity for the public, neighboring communities, local and regional agencies, as well as, private and non-profit entities to comment on the NHMP during review.[1] Keeping the public informed of the City's efforts to reduce its risk to future natural hazard events is important for successful NHMP implementation and maintenance. The City is committed to involving the public in the NHMP review and update process (Volume I, Section 4). The City posted the plan update for public comment before FEMA approval, and after approval will maintain the plan on the City's website: http://www.canbyoregon.gov.

NHMP Maintenance

The Clackamas County NHMP and City addendum will be updated every five years in accordance with the update schedule outlined in the Disaster Mitigation Act of 2000. During the County NHMP update process, the City will also review and update its addendum (Volume I, Section 4). The convener will be responsible for convening the HMAC to address the questions outlined below.

- Are there new partners that should be brought to the table?
- Are there new local, regional, state or federal policies influencing natural hazards that should be addressed?
- Has the community successfully implemented any mitigation activities since the NHMP was last updated?
- Have new issues or problems related to hazards been identified in the community?
- Are the actions still appropriate given current resources?

[1] Code of Federal Regulations, Chapter 44. Section 201.6, subsection (b). 2015

- Have there been any changes in development patterns that could influence the effects of hazards?
- Have there been any significant changes in the community's demographics that could influence the effects of hazards?
- Are there new studies or data available that would enhance the risk assessment?
- Has the community been affected by any disasters? Did the NHMP accurately address the impacts of this event?

These questions will help the HMAC determine what components of the mitigation plan need updating. The HMAC will be responsible for updating any deficiencies found in the NHMP.

Mitigation Strategy

This section of the NHMP addendum addresses 44 CFR 201.6(c)(3(iv), *Mitigation Strategy*.

The City's mitigation strategy (action items) were first developed during the 2003 NHMP planning process and revised during subsequent NHMP updates. During these processes, the HMAC assessed the City's risk, identified potential issues, and developed a mitigation strategy (action items).

During the 2018 update process the City re-evaluated their mitigation strategy (action items). During this process action items were updated, noting what accomplishments had been made and whether the actions were still relevant; any new action items were identified at this time (see Attachment A for more information on changes to action items).

Priority Action Items

Table CA-1 presents a list of mitigation actions. The HMAC decided to modify the prioritization of action items in this update to reflect current conditions (risk assessment), needs, and capacity. High priority actions are shown in **bold** text with grey highlight. The City will focus their attention, and resource availability, upon these achievable, high leverage, activities over the next five-years. Although this methodology provides a guide for the HMAC in terms of implementation, the HMAC has the option to implement any of the action items at any time. This option to consider all action items for implementation allows the committee to consider mitigation strategies as new opportunities arise, such as capitalizing on funding sources that could pertain to an action item that is not currently listed as the highest priority. Refer to Attachment A for detailed information for each action. Full text of the plan goals referenced in Table CA-1 is located on page CA-2.

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Table CA-1 Canby Action Items

Natural Hazard Action ID	Action Item	Coordinating Organization (Lead)	Internal Partners	Timing	Plan Goals Addressed				
					Goal 1	Goal 2	Goal 3	Goal 4	Goal 5
MH #1	**Update and revise the Canby Emergency Operations Plan.**	**Canby Fire District**	**City of Canby**	**Short Term**	✓		✓	✓	
MH #2	**Ensure there are adequate shelter facilities in hazard-free zones to serve Canby residents. Identify potential shelter sites and evaluate their relative structural risks/structural deficiencies. Seek funding for upgrades on shelter sites if needed.**	**Hazard Mitigation Advisory Committee (HMAC)**	**Public Works, Planning, Building**	**Ongoing**	✓		✓	✓	
MH #3	**Develop, enhance, and implement education programs designed to reduce the losses from natural hazards.**	**HMAC**	**Canby Fire District, Canby Utility, Administration**	**Ongoing**	✓	✓	✓	✓	✓
MH #4	**Integrate the goals and action items from the Canby Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.**	**HMAC**	**Planning, Public Works**	**Ongoing**	✓	✓	✓	✓	✓
MH #5	Identify, plan, and establish an alternate potable water source on the Willamette River.	Canby Utility	HMAC	Short Term	✓	✓		✓	✓
EQ #1	Conduct seismic evaluations and upgrades on identified critical and essential facilities and infrastructure for implementing appropriate structural and non-structural mitigation strategies.	HMAC	Administration, Planning, Public Works, Police, Canby Fire District, Canby Utility	Long Term	✓		✓	✓	

Natural Hazard Action ID	Action Item	Coordinating Organization (Lead)	Internal Partners	Timing	Plan Goals Addressed				
					Goal 1	Goal 2	Goal 3	Goal 4	Goal 5
FL #1	Evaluate and upgrade surface water management infrastructure and identify appropriate mitigation strategies.	Public Works	Planning, Administration	Ongoing	✓	✓	✓	✓	
FL #2	**Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.**	**Planning**	**Public Works**	**Ongoing**	✓	✓		✓	✓
LS #1	Reduce the vulnerability of property owners in landslide-prone areas.	Planning	Public Works	Long Term	✓	✓		✓	✓
SW #1	Obtain funding to bury power lines subject to frequent failures to reduce power outages from the windstorm and severe winter storm hazard, where possible.	Canby Utility	Public Works	Ongoing	✓			✓	
WF #2	**Coordinate wildfire mitigation action items through the Clackamas County Community Wildfire Protection Plan.**	**Fire District**	**Public Works, Planning**	**Ongoing**	✓	✓	✓	✓	✓

Source: City of Canby HMAC, 2018.
Note: Full text of the plan goals referenced in this table is located on page CA-2.

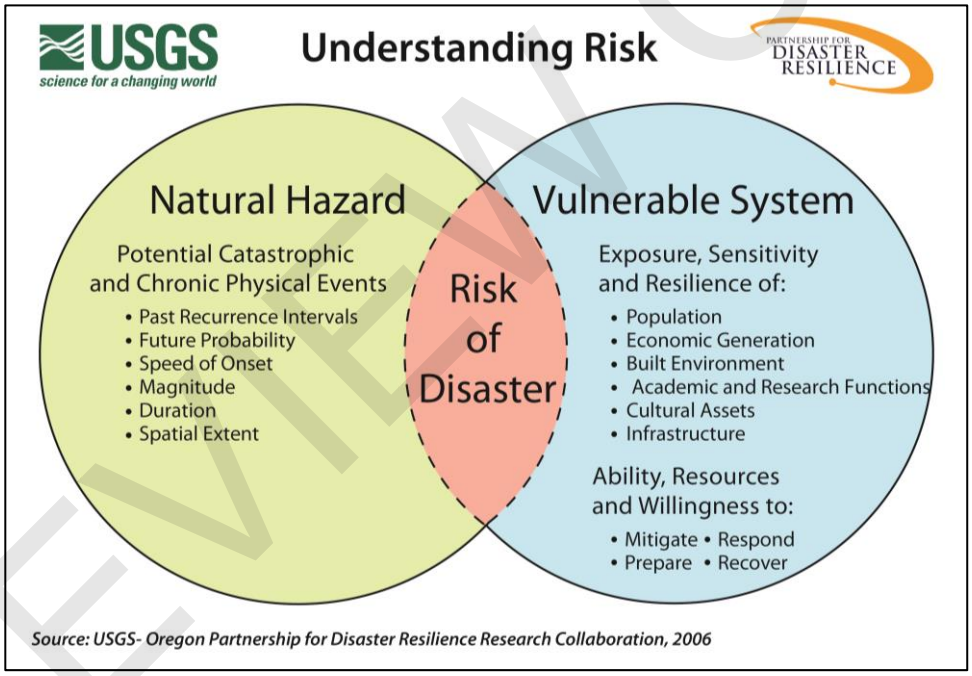
Risk Assessment

This section of the NHMP addendum addresses 44 CFR 201.6(b)(2) - Risk Assessment. In addition, this chapter can serve as the factual basis for addressing Oregon Statewide Planning Goal 7 – Areas Subject to Natural Hazards. Assessing natural hazard risk has three phases:

- **Phase 1:** Identify hazards that can impact the jurisdiction. This includes an evaluation of potential hazard impacts – type, location, extent, etc.
- **Phase 2:** Identify important community assets and system vulnerabilities. Example vulnerabilities include people, businesses, homes, roads, historic places and drinking water sources.
- **Phase 3:** Evaluate the extent to which the identified hazards overlap with or have an impact on, the important assets identified by the community.

The local level rationale for the identified mitigation strategies (action items) is presented herein and within Volume I, Section 3 and Volume III, Appendix C. The risk assessment process is graphically depicted in Figure CA-1. Ultimately, the goal of hazard mitigation is to reduce the area of risk, where hazards overlap vulnerable systems.

Figure CA-1 Understanding Risk



Hazard Analysis

The Canby HMAC developed their hazard vulnerability assessment (HVA), using their previous HVA and the County's HVA as a reference. Changes from their previous HVA and the County's HVA were made where appropriate to reflect distinctions in vulnerability and risk from natural hazards unique to Canby, which are discussed throughout this addendum. For detailed information on the methodology see Volume I, Section 2.

Table CA-2 shows the HVA matrix for Canby listing each hazard in order of rank from high to low. For local governments, conducting the hazard analysis is a useful step in planning for hazard mitigation, response and recovery. The method provides the jurisdiction with sense of hazard priorities but does not predict the occurrence of a hazard.

Two catastrophic hazards (Cascadia Subduction Zone earthquake and Crustal earthquake) and one chronic hazard (flood) rank as the top hazard threats to the City (Top Tier). Winter storm, windstorm, drought, and wildfire comprise the next highest ranked hazards (Middle Tier), while the extreme heat, volcanic event, and landslide hazards comprise the lowest ranked hazards (Bottom Tier).

Table CA-2 Hazard Analysis Matrix – Canby

Hazard	History	Vulnerability	Maximum Threat	Probability	Total Threat Score	Hazard Rank	Hazard Tiers
Earthquake - Cascadia	4	45	100	49	198	#1	*Top Tier*
Flood	16	40	80	56	192	#2	
Earthquake - Crustal	6	50	100	21	177	#3	
Winter Storm	10	30	70	56	166	#4	*Middle Tier*
Windstorm	20	35	50	56	161	#5	
Drought	10	20	50	28	108	#6	
Wildfire	6	20	50	21	97	#7	
Extreme Heat Event	2	20	40	28	90	#8	*Bottom Tier*
Volcanic Event	2	15	50	7	74	#9	
Landslide	14	15	20	21	70	#10	

Source: Canby HMAC, 2018.

Table CA-3 categorizes the probability and vulnerability scores from the hazard analysis for the City and compares the results to the assessment completed by the Clackamas County HMAC. Variations between the City and County are noted in **bold** text within the city ratings.

Table CA-3 Probability and Vulnerability Comparison

Hazard	Canby		Clackamas County	
	Probability	Vulnerability	Probability	Vulnerability
Drought	**Moderate**	**Moderate**	High	Low
Earthquake - Cascadia	Moderate	High	Moderate	High
Earthquake - Crustal	Low	High	Low	High
Extreme Heat	**Moderate**	**Moderate**	Low	High
Flood	High	**High**	High	Moderate
Landslide	**Low**	Low	High	Low
Volcanic Event	Low	**Low**	Low	Moderate
Wildfire	**Low**	Moderate	High	Moderate
Windstorm	**High**	**Moderate**	Moderate	Low
Winter Storm	**High**	Moderate	Moderate	Moderate

Source: Canby and Clackamas County HMAC, 2018.

Community Characteristics

Table CA-4 and the following section provides information on City specific demographics and assets. Many of these community characteristics can affect how natural hazards impact communities and how communities choose to plan for natural hazard mitigation. Considering the City specific assets during the planning process can assist in identifying appropriate measures for natural hazard mitigation. Between 2010 and 2016 the City grew by 590 people (4%; as of 2018 the population was 16,800) and median household income decreased by about 2%.[2] Between 2018 and 2040 the population is forecast to grow by 53% to 25,748.[3] New development has complied with the standards of the Oregon Building Code and the city's development code.

Transportation/Infrastructure

Canby is accessible by state highway 99E, running north to south on the city's west side. Congestion on 99E can result in the diversion of traffic onto City streets. Canby is also bisected by the Union Pacific Railroad main line, which separates the North side from the South; passenger service is provided by Amtrak. Congestion

The City's public transit is provided by the Canby Area Transit system, which provides shuttle transportation to scheduled route locations within Canby. The Canby Ferry, one of three ferries still in operation on the Willamette River, can transport nine vehicles per trip across the Willamette River. The availability and quality of pedestrian and bicycling facilities (sidewalks, bike lanes, and pathways) is inconsistent, generally newer neighborhoods have facilities. Base Maps are found on the city's website.

Economy

Canby is a relatively self-sufficient city that operates its own electric and water service (uncommon in Oregon). The business district includes a thriving downtown core as well as flourishing businesses along Highway 99E. The Canby area has a multitude of attractions tied to the bountiful nursery industry, which attract thousands of visitors annually. In Clackamas County, 75% of the nursery acreage is in the vicinity of Canby.

To a certain extent, Canby has been a "bedroom" community for Portland and Salem, though the City hopes to moderate this trend by increasing industrial development. The City is accessible by rail and highway and is located outside of the Portland Air Quality Maintenance area (AQMA). The 2007 Comprehensive Plan designated nearly a third of the total urbanizable area for future industrial development. The city has identified areas for commercial, office, or mixed use development in an updated Comprehensive Plan Map from 2014: map. The two major industries for residents of Canby are educational services, and health care and social assistance (accounting for 22% of the market) and manufacturing (16%).[4]

[2] Portland State University, Population Research Center, "Annual Population Estimates", 2016 and Social Explorer, Table T57, U.S. Census Bureau, 2012-2016 and 2006-2010 American Community Survey Estimates.
[3]. Portland State University, Population Research Center, "Population Forecast Tables", 2017.
[4] Portland State University, Population Research Center, "Annual Population Estimates", 2016 & 2018 and Social Explorer, Table T57, U.S. Census Bureau, 2012-2016 and 2006-2010 American Community Survey Estimates.

Table CA-4 Community Characteristics

Population Characteristics		
2010 Population	15,830	
2016 Population [2018 Population]	16,420	[16,800]
2040 Forecasted Population	25,748	
Race (non-Hispanic) and Ethnicity (Hispanic)		
White		75%
Black/ African American		< 1%
American Indian and Alaska Native		< 1%
Asian		2%
Native Hawaiian and Other Pacific Islander		0%
Some Other Race		< 1%
Two or More Races		3%
Hispanic or Latino		20%
Limited or No English Spoken		9%
Vulnerable Age Groups		
Less than 15 Years	3,889	23%
65 Years and Over	2,528	15%
Disability Status		
Total Population	1,923	11%
Children	130	3%
Seniors	996	40%

Income Characteristics		
Households by Income Category		
Less than $15,000	375	6%
$15,000-$29,999	850	14%
$30,000-$44,999	752	12%
$45,000-$59,999	1,061	17%
$60,000-$74,999	669	11%
$75,000-$99,999	995	16%
$100,000-$199,999	1,268	20%
$200,000 or more	246	4%
Median Household Income	$62,035	
Poverty Rates		
Total Population	2,682	16%
Children	741	16%
Seniors	114	5%
Housing Cost Burden		
Owners with Mortgage	1,210	29%
Renters	989	48%

Source: U.S. Census Bureau, 2012-2016 American Community Survey; Portland State University, Population Research Center, "Annual Population Estimates", 2016 & 2018; Portland State University, Population Research Center, "Population Forecast Tables", 2017.

Housing Characteristics		
Housing Units		
Single-Family	4,565	71%
Multi-Family	1,315	21%
Mobile Homes	519	8%
Year Structure Built		
Pre-1970	993	16%
1970-1989	2,250	35%
1990 or later	3,162	49%
Housing Tenure and Vacancy		
Owner-occupied	4,164	65%
Renter-occupied	2,052	32%
Seasonal	48	1%
Vacant	189	3%

Canby has grown substantially since its incorporation in 1893 and has an area today of about 4 square miles. Canby lies in the heart of very productive agricultural lands.

Canby's climate is consistent with the Marine west coast climate zone, with warm summers and cool, wet winters. Canby receives most of its rainfall between October and May, and averages 45 inches of rain.[5] Snowfall is rare but can occur annually.

The City of Canby is located on a relatively flat terrain and, with few exceptions, only gentle changes in the topography of less than 30 feet occur within the city limits and Urban Growth Boundary (UGB); between 140 to 170 feet above mean sea level. The southwest portion of the city drops abruptly at the Molalla River to an elevation of approximately 80 feet.

At the northern border of the UGB, the topography gradually slopes to the Willamette River, dropping from an elevation of approximately 130 feet to 100 feet at the city's wastewater treatment facility. To the east of Canby, the topography changes very little until beyond the urban growth boundary, where the ground has undulating gentle hills in the southeastern areas and steep rocky cliffs in the northeastern areas along the Willamette River.

[5] "Monthly Average for Canby, OR" The Weather Channel Interactive, Inc. Retrieved April 11, 2019.

Community Assets -

This section outlines the resources, facilities, and infrastructure that, if damaged, could significantly impact the public safety, economic conditions, and environmental integrity of Canby. The community assets identified below were identified by the City of Canby. The tables identify which hazards each asset may be exposed to, based upon both a GIS analysis as well as HMAC member knowledge. Additional information is needed to fully understand the extent of risk to each asset. It is important to note that the facilities identified as "critical" and "essential" are characterized differently than the structural code that identifies buildings as "essential" and "non-essential." The structural code uses different language and criteria and therefore have completely different meanings than the buildings identified in this addendum.

Critical Facilities

These facilities are critical to government response, and recovery activities (i.e. life, safety, property, and environmental protection). These facilities include: 911 Centers, Emergency Operations Centers, Police, and Fire Stations, Public Works facilities, sewer, and water facilities, hospitals, bridges, roads, shelters, and more.

Table CA-5 Critical Facilities in Canby

Facility	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm
Critical Facilities									
4 Power Substations		X	X	X		X		X	X
Canby Area Transit (CAT)		X	X			X			X
Canby Utility Business Offices		X				X			X
City Hall Complex/Library		X				X			X
Public Works Building (EOC #3)	X	X	X	X		X	X	X	X
Telephone Central Station		X				X		X	X
Waste Water Treatment Facilities		X	X	X		X	X	X	X
Water Treatment Facilities – including reservoirs, intake structures and raw water pump houses	X	X	X	X	X	X	X	X	X
Fire/Police Stations									
Canby Police Department (EOC #2)	X	X		X	X	X			X
Fire Station #362 (EOC #1)	X	X	X			X			X
Fire Station #365 (South of Canby)	X	X	X			X	X	X	X

Critical Infrastructure:

Infrastructure that provides necessary services for emergency response include:

Table CA-6 Critical Infrastructure in Canby

Facility	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm
Critical Infrastructure									
Bridges		X		X	X			X	X
Canby Disposal		X		X		X		X	X
Canby Ferry	X	X	X	X	X	X	X	X	X
Communication Towers		X					X	X	X
Gas Lines		X		X	X				
NW Natural Pipeline/Telephone Fiber		X		X	X				
Pacific Pride Storage Tanks		X							
Power Lines		X	X	X	X	X	X	X	X
Railroads		X		X	X	X	X	X	X
Telephone Lines		X		X	X	X	X	X	X
Transportation Networks		X	X	X	X	X	X	X	X
Wastewater Collection	X	X		X	X	X	X	X	X
Water Treatment, Storage and Distribution Lines	X	X	X	X	X	X	X	X	X

Cultural and Historic Assets

The cultural and historic heritage of a community is more than just tourist charm. For families that have lived in the city for generations and new resident alike, it is the unique places, stories, and annual events that make Canby an appealing place to live. The cultural and historic assets are both intangible benefits and obvious quality-of-life- enhancing amenities. Because of their role in defining and supporting the community, protecting these resources from the impact of disasters is important.

Table CA-7 Cultural or Historic Assets in Canby

Facility	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm
Cultural or Historic Assets									
Canby Chapel		X				X		X	X
Canby Depot Museum		X				X		X	X
Canby Ferry	X	X	X	X	X	X	X	X	X
Cemeteries		X				X		X	X
Clackamas County Event Center	X	X	X			X	X	X	X

Essential Facilities

Facilities that are essential to the continued delivery of key government services, and/or that may significantly impact the public's ability to recover from the emergency. These facilities may include: City buildings such as the Public Services Building, the City Hall, and other public facilities such as schools.

Table CA-8 Essential Facilities in Canby

Facility	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm
Essential Facilities									
Schools									
Ackerman Elementary School		X				X		X	X
Baker Prairie School		X				X		X	X
Canby High School		X				X		X	X
Other Essential Facilities									
Canby Adult Center		X				X		X	X
Canby Christian Church		X				X		X	X
Clackamas County Event Center		X				X		X	X
Four Square Church		X			X	X	X	X	X
Medical Clinics		X				X		X	X
Old Canby Library Building		X				X		X	X
St. Patricks Church		X				X		X	X
Student Transportation		X				X			X
United Methodist Church		X				X		X	X

Environmental Assets:

Environmental assets are those parks, green spaces, wetlands, and rivers that provide an aesthetic, and functional ecosystem services for the community.

Table CA-9 Environmental Assets in Canby

Facility	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm
Economic Assets/Population Centers									
Canby City Parks	X	X	X	X	X	X	X	X	X
Canby Utility Bottom Lands	X	X	X	X	X	X	X	X	X
Emerald Park	X	X	X	X	X	X	X	X	X
Molalla River State Park	X	X	X	X	X	X	X	X	X
Willow Creek	X	X	X	X		X	X	X	X

Vulnerable Populations:

Vulnerable populations, including seniors, disabled citizens, women, and children, as well those people living in poverty, often experience the impacts of natural hazards and disasters more acutely. Populations that have special needs or require special consideration include:

Table CA-10 Vulnerable Populations in Canby

Facility	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm
Vulnerable Populations									
Adult Foster Homes		X	X			X	X	X	X
Canby Adult Center		X	X			X		X	X
Countryside Living – assisted living		X	X			X		X	X
Hope Village – senior living and rehab		X	X			X		X	X
Providence Health Center	X	X	X	X	X	X	X	X	X
Rackleff House – assisted living		X				X	X	X	X
Riverside RV Park	X	X	X	X	X	X	X	X	X
Village on the Lochs		X	X	X	X	X	X	X	X
Schools									
Schools listed in Essential Facilities	X	X	X	X	X	X	X	X	X

Hazardous Materials:

Facilities that, if damaged, could cause serious secondary impacts may also be considered "critical." A hazardous material facility is one example of this type of critical facility. Those sites that store, manufacture, or use potentially hazardous materials include:

Table CA-11 Hazardous Materials in Canby

Facility	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm
Hazardous Materials									
American Steel		X							
BBC Steel		X					X		
Johnson Controls Inc.		X					X		
JV Northwest		X							
Pacific Pride Fuel Storage Tanks		X							
Railroad		X		X	X	X	X	X	X
SR Smith		X			X		X		
Wastewater Treatment Facility		X		X			X		
Water Treatment Facility	X	X	X	X		X	X	X	X
Wilco		X							

Economic Assets/Population Centers:

Economic assets include businesses that employ large numbers of people and provide an economic resource to the City. If damaged, the loss of these economic assets could significantly affect economic stability, and prosperity. Population Centers usually are aligned with economic centers and are a concern during evacuation/notification during a hazard event.

Table CA-12 Economic Assets/Population Centers in Canby

Facility	Drought	Earthquake	Extreme Heat	Flood	Landslide	Volcanic Event	Wildfire	Windstorm	Winter Storm
Economic Assets/Population Centers									
All multi-family dwelling structures	X	X		X	X	X	X	X	X
Churches listed in Essential Facilities	X	X	X	X	X	X	X	X	X
Grocery Stores		X				X		X	X
Johnson Controls		X			X	X	X	X	X
Pioneer Industrial Park		X				X	X	X	X
Post Office		X	X	X		X		X	X
Potter Industries		X				X		X	X
Schools listed in Essential Facilities	X	X	X	X	X	X	X	X	X
Sprague Controls		X				X		X	X
SR Smith		X			X	X	X	X	X
Student Transportation		X				X		X	X
Willamette Plastics		X			X	X	X	X	X
Wilson Construction Office		X				X		X	X

Hazard Characteristics

Drought

The HMAC determined that the City's probability for drought is **moderate** and that their vulnerability to drought is **moderate**. *These ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 2 describes the characteristics of drought hazards, history, as well as the location, extent and probability of a potential event. Due to the climate of Clackamas County, past and present weather conditions have shown an increasing potential for drought.

The City of Canby currently obtains its potable water from the Molalla River with an intake pump station capacity of 7.9 million gallons a day (mgd). The primary groundwater source is the Springs Gallery with a seasonally varied capacity up to 1.4 mgd, though low pH and

moderate nitrate concentrations limit the use of it as the primary source.[6] The Canby Utility water system includes surface and groundwater sources, treatment facilities, 66 miles of piping, four storage reservoirs with total usable capacity of 5.5 million gallons, and three pump stations. The Water System Master Plan was last updated in 2010 to provide long-term guidance for the development of the City's water system, which is a supporting document for the Comprehensive Plan.

Vulnerability Assessment

Due to insufficient data and resources, Canby is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard. For a list of facilities and infrastructure vulnerable to this hazard see the Community Assets section and Tables CA-5 to CA-12.

Mitigation Activities

Canby Utility has a Water Supply Shortage Contingency Plan that details voluntary and non-voluntary actions to be taken in the vent of a water shortage. Additional drought hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County NHMP.

Please review Volume I, Section 2 for additional information on this hazard.

Earthquake (Cascadia Subduction Zone)

The HMAC determined that the City's probability for a Cascadia Subduction Zone (CSZ) earthquake is **moderate** and that their vulnerability to a CSZ earthquake is **high**. *The probability rating decreased, and the vulnerability rating did not change, since the previous version of this NHMP addendum. Note: Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: Cascadia Subduction Zone (CSZ) earthquake and Crustal earthquake.*

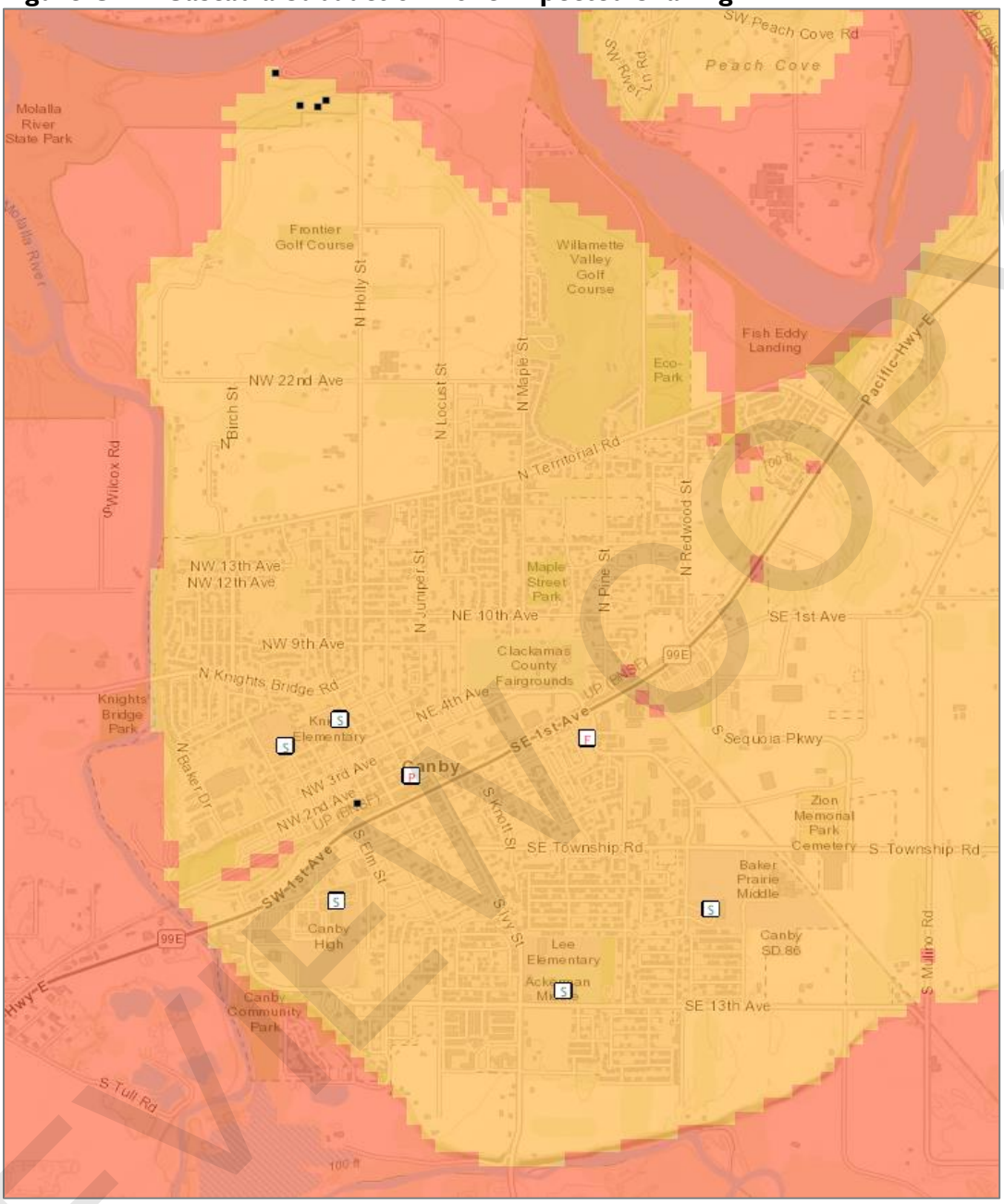
Volume I, Section 2 describes the characteristics of earthquake hazards, history, as well as the location, extent and probability of a potential event. Generally, an event that affects the County is likely to affect Canby as well. The causes and characteristics of an earthquake event are appropriately described within the Volume I, Section 2 as well as the location and extent of potential hazards. Previous occurrences are well documented within Volume I, Section 2 and the community impacts described by the County would generally be the same for Canby as well.

Within the Northern Willamette Valley/Portland Metro Region, three potential faults and/or zones can generate high-magnitude earthquakes. These include the Cascadia Subduction Zone, Portland Hills Fault Zone, and Gales Creek-Newberg-Mt. Angel Structural Zone (discussed in the crustal earthquake section).

Figure CA-2 displays relative shaking hazards from a Cascadia Subduction Zone earthquake event. As shown in the figure, most of the city is expected to experience very strong shaking (orange), while areas near rivers and streams will experience severe (light red) to violent (dark red) shaking in a CSZ event.

[6] Water Service Information. Canby Utility. Visited April 18, 2019

Figure CA-2 Cascadia Subduction Zone Expected Shaking



Source: [Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)]
Note: To view detail click the link above to access Oregon HazVu

Cascadia Subduction Zone

The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a rate of 4 cm per year. Scientists have found evidence that 11 large, tsunami-producing earthquakes have occurred off the Pacific Northwest coast in the past 6,000 years. These earthquakes took place roughly between 300 and 5,400 years ago with an average occurrence interval of about 510 years. The most recent of these large earthquakes took place in approximately 1700 A.D.[7]

The city's proximity to the Cascadia Subduction Zone, potential slope instability and the prevalence of certain soils subject to liquefaction and amplification combine to give the city a high-risk profile. Due to the expected pattern of damage resulting from a CSZ event, the Oregon Resilience Plan divides the State into four distinct zones and places the city predominately within the "Valley Zone" (Valley Zone, from the summit of the Coast Range to the summit of the Cascades). Within the Northwest Oregon region, damage and shaking is expected to be strong and widespread - an event will be disruptive to daily life and commerce and the main priority is expected to be restoring services to business and residents.

Earthquake (Crustal)

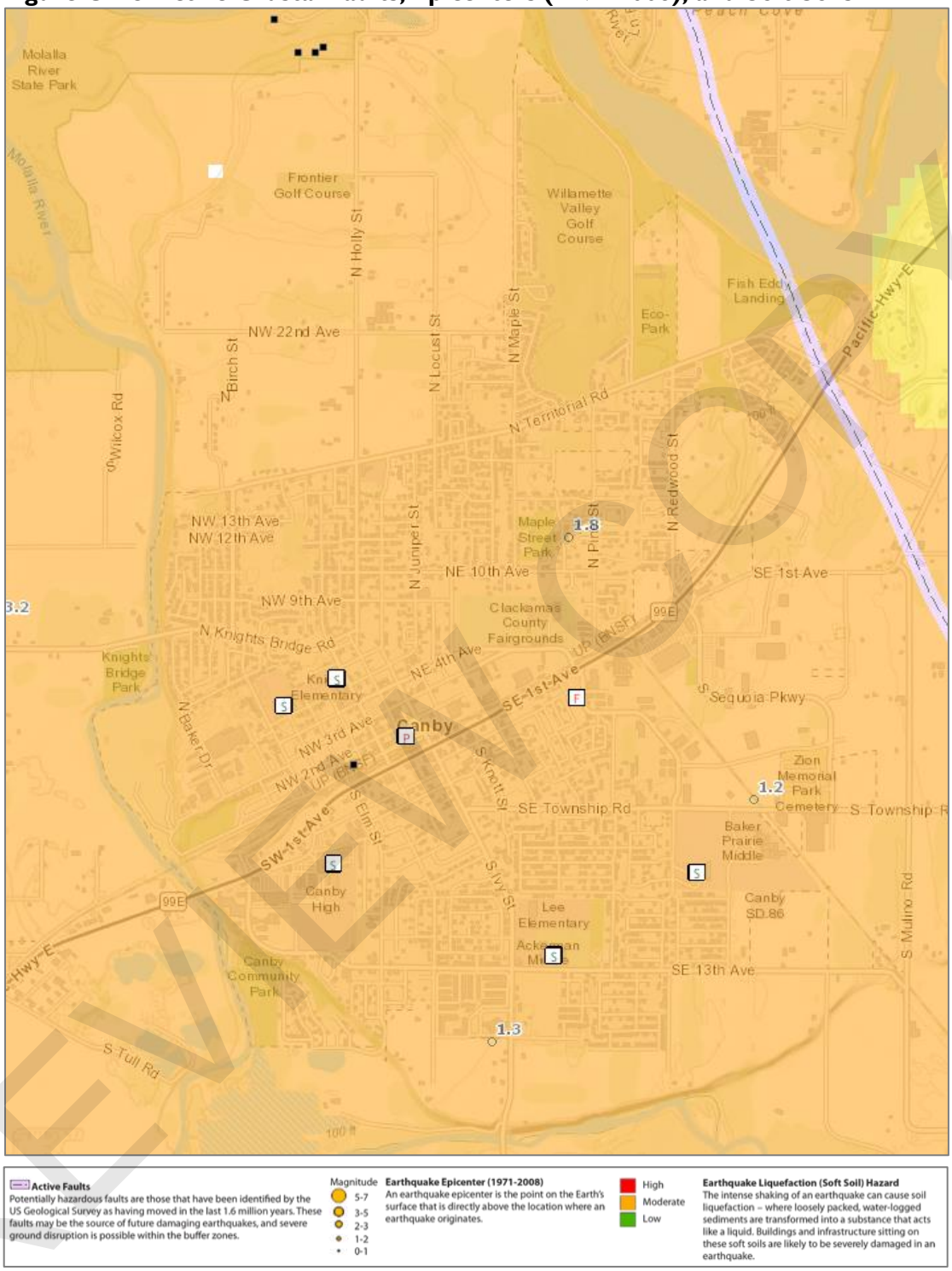
The HMAC determined that the City's probability for a crustal earthquake is **low** and that their vulnerability to crustal earthquake is **high**. *The probability rating decreased while the vulnerability did not change since the previous version of this NHMP addendum. Note: Previously, the earthquake hazard profile was a single risk assessment, which is now divided into two separate earthquake hazards: Crustal earthquake, and Cascadia Subduction Zone (CSZ) earthquake.*

Volume I, Section 2 describes the causes and characteristics of earthquake hazards, history, as well as the location, extent, and probability of a potential event. Generally, an event that affects the County is likely to affect Canby as well. Figure CA-3 shows a generalized geologic map of the Canby area that includes the areas for potential regional active faults, earthquake history (1971-2008), and soft soils (liquefaction) hazard. The figure shows the areas of greatest concern within the City limits as red and orange.

There are two potential crustal faults and/or zones near the City that can generate high-magnitude earthquakes. These include the Gales Creek-Mt. Angel Structural Zone and Portland Hills Fault Zone (discussed in greater detail below). Other faults include the Canby-Molalla fault (running through the city's east edge intersecting Highway 99E) and Oatfield fault (just to the east of the city on the eastern side of the Willamette River), and the Mt. Hood Fault in eastern Clackamas County. Historical records count over 56 earthquakes in the Portland-metro area. The more severe ones occurred in 1877, 1880, 1953 and 1962. The most recent severe earthquake was the March 25, 1993 Scotts Mills quake. It was a 5.6 magnitude quake with aftershocks continuing at least through April 8.

[7] The Cascadia Region Earthquake Workgroup, 2005. Cascadia Subduction Zone Earthquakes: A magnitude 9.0 earthquake scenario. http://www.crew.org/PDFs/CREWSubductionZoneSmall.pdf

Figure CA-3 Active Crustal Faults, Epicenters (1971-2008), and Soft Soils



Active Faults
Potentially hazardous faults are those that have been identified by the US Geological Survey as having moved in the last 1.6 million years. These faults may be the source of future damaging earthquakes, and severe ground disruption is possible within the buffer zones.

Magnitude
5-7
3-5
2-3
1-2
0-1

Earthquake Epicenter (1971-2008)
An earthquake epicenter is the point on the Earth's surface that is directly above the location where an earthquake originates.

High
Moderate
Low

Earthquake Liquefaction (Soft Soil) Hazard
The intense shaking of an earthquake can cause soil liquefaction – where loosely packed, water-logged sediments are transformed into a substance that acts like a liquid. Buildings and infrastructure sitting on these soft soils are likely to be severely damaged in an earthquake.

Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)
Note: To view detail click the link above to access Oregon HazVu

Canby-Molalla Fault Zone

The Canby-Molalla Fault Zone is a series of NE-trending fault that vertically displace the Columbia River Basalt with discontinuous aeromagnetic anomalies that represent significant offset of Eocene basement and volcanic rocks. The fault zone extends for 31 miles from the vicinity of Tigard south through the towns of Canby and Molalla in northern Oregon.

Portland Hills Fault Zone

The Portland Hills Fault Zone is a series of NW-trending faults that vertically displace the Columbia River Basalt by 1,130 feet and appear to control thickness changes in late Pleistocene (approx. 780,000 years ago) sediment. The fault zone extends along the eastern margin of the Portland Hills for 25 miles and lies about 11 miles northeast of Canby.

Earthquake-induced damages are difficult to predict, and depend on the size, type, and location of the earthquake, as well as site-specific building, and soil characteristics. Presently, it is not possible to accurately forecast the location or size of earthquakes, but it is possible to predict the behavior of soil at any site. In many major earthquakes, damages have primarily been caused by the behavior of the soil.

Vulnerability Assessment

Due to insufficient data and resources, Canby is currently unable to perform a quantitative risk assessment for this hazard. However, the City completed an analysis, using the best available data, as a component of the vulnerability assessment in 2009, updated in 2012, and reviewed and updated, as appropriate, in 2018. This analysis looked at identified hazard areas in conjunction with available data on property exposed to the hazard. Exposure of community assets to natural hazards was determined by manually comparing community assets with each hazard and identifying where assets and hazards intersected. Additionally, in 2018 the Department of Geology and Mineral Industries (DOGAMI) completed a regional impact analysis for earthquakes originating from the Cascadia Subduction Zone and Portland Hills faults (O-18-02), findings from that report are provided at the end of the crustal earthquakes hazard section.

The city has overall moderate vulnerability to an earthquake, which includes the essential and critical facilities. Canby's infrastructure is particularly vulnerable to earthquake damage. All of the city's water facilities are all within the moderate hazard zone. Highway 99E crosses over the Molalla River and runs along the Willamette River, which are seismically vulnerable areas and might affect the ability of outside assistance in the case of an earthquake. During a major earthquake, emergency responders may have difficulty performing their duties because their buildings could be impacted by the event. The Canby Fire District 62 Station, and the Police Department's headquarters are in the moderate to high hazard zones. Areas near the Willamette and Molalla Rivers are likely comprised of softer soils prone to liquefaction. This can be very destructive to underground utilities such as water and sewer lines. Buildings and water lines can sink into the liquefied ground while sewer pipes, manholes and pump stations (assets partially filled with air) may float to the surface. After the earthquake, the liquefied soil will re-solidify, locking tilted buildings and broken pipe connections into place. In 2017, the Canby Fire District Station #62 was awarded a Seismic Rehabilitation Grant for $233,256 and retrofitted their main fire station. For a list of facilities and infrastructure vulnerable to this hazard see the Community Assets section and Tables CA-5 to CA-12.

Vulnerable populations such as children could be significantly impacted, as many schools lie in the moderate hazard zone. The data gathered from the statewide DOGAMI inventory should be used to prioritize school buildings in Canby for seismic hazard retrofitting.

Seismic building codes were implemented in Oregon in the 1970s, however, stricter standards did not take effect until 1991 and early 2000s. As noted in the community profile, approximately 51% of residential buildings were built prior to 1990, which increases the City's vulnerability to the earthquake hazard. Information on specific public buildings' (schools and public safety) estimated seismic resistance, determined by DOGAMI in 2007, is shown in Table CA-13; each "X" represents one building within that ranking category. Of the facilities evaluated by DOGAMI using their Rapid Visual Survey (RVS), none have a very high (100% chance) or high (greater than 10% chance) collapse potential. *Note: one fire station has been rebuilt and the police department moved to a newly constructed location.*

Table CA-13 Rapid Visual Survey Scores

Facility	Site ID*	Level of Collapse Potential			
		Low (<1%)	Moderate (>1%)	High (>10%)	Very High (100%)
Schools					
Ackerman Center (350 SE 13th Ave)	Clac_sch54	X			
Eccles Elementary (562 NW 5th Ave)	Clac_sch55	X			
Knight Elementary (501 N Grant St)	Clac_sch53	X			
Lee Elementary (1110 S Ivy St)	-	Not assessed as part of the 2007 RVS			
Trost Elementary (800 S Redwood St)	Clac_sch76	X			
Baker Prairie Middle (1859 S Township Rd)	-	Not assessed as part of the 2007 RVS			
Canby High (721 SW 4th Ave)	Clac_sch66	X			
Public Safety					
Canby Fire District Main Station 62 (221 S Pine St)	**Clac_fir39**	**Seismic retrofit via 2015-17 SRGP**			
Canby Fire District Station 65 (26815 S Hwy 170) (Outside City)	Clac_fir48	X			
Canby Policy Department (1175 NW 3rd Ave)	-	**Built at current site in 2012**			

Source: DOGAMI 2007. Open File Report O-07-02. Statewide Seismic Needs Assessment Using Rapid Visual Assessment. "*" – Site ID is referenced on the RVS Clackamas County Map
Note 1: Bold indicates facilities that have been seismically retrofitted or rebuilt.
Note 2: Private schools were not assessed by DOGAMI as part of O-07-02.

In addition to building damages, utility (electric power, water, wastewater, natural gas) and transportation systems (bridges, pipelines) are also likely to experience significant damage. There is a low probability that a major earthquake will result in failure of upstream dams.

Utility systems will be significantly damaged, including damaged buildings and damage to utility infrastructure, including water treatment plants and equipment at high voltage substations (especially 230 kV or higher which are more vulnerable than lower voltage substations). Buried pipe systems will suffer extensive damage with approximately one break per mile in soft soil areas. There would be a much lower rate of pipe breaks in other areas. Restoration of utility services will require substantial mutual aid from utilities outside of the affected area.

Mitigation Activities

Canby has taken mitigation steps to reduce the city's vulnerably in earthquake events. Seismic retrofit grant awards per the Seismic Rehabilitation Grant Program[8] have been used to retrofit Canby Fire District Station 62, (Phase Two of 2015-2017 grant award, $233,256) and the Police Station was rebuilt on a new location (1175 NW 3rd Ave) in 2012. Additional mitigation activities completed by the City of Canby include:

- Seismic strengthening future projects including schools and other critical infrastructure located in the Long-Range Facilities Plan
- Seismically retrofitted: Canby Telcom control center and water reservoir.
- Compliance with SB 13, enacted in 2001, requiring local governments to develop seismic preparation procedures, inform their employees about the procedures, and conduct earthquake drills.
- The Canby School District has developed seismic preparation procedures and conducts drills in accordance with the Office of Emergency Management guidelines. These drills include "duck, cover and hold on" and familiarization with exit routes and methods of exiting the building during an earthquake.
- Adoption of a policy to require undergrounding of power lines in new subdivisions.
- Development Code restrictions regarding construction on steep slopes.

Earthquake Regional Impact Analysis

In 2018 DOGAMI completed a regional impact analysis for earthquakes originating from the Cascadia Subduction Zone and Portland Hills faults (O-18-02). Their study focused on damage to buildings, and the people that occupy them, and to two key infrastructure sectors: electric power transmission and emergency transportation routes. Each earthquake was studied with wet and dry soil conditions and for events that occur during the daytime (2 PM) and night time (2 AM). Impacts to buildings and people were tabulated at the county, jurisdictional (city), and neighborhood unit level. Estimated damaged varied widely across the study area depending on local geology, soil moisture conditions, type of building, and distance from the studied faults. In general, damage from the Cascadia Subduction Zone scenario was greater in the western portion of the study area, however, damage could still be significant in some areas east of the Willamette River. The report found that damage to high-value commercial and industrial buildings was high since many of these facilities are in areas of high to very high liquefaction hazard. Casualties were higher during the daytime scenario (generally double) since more people would be at work and occupying non-wood structures that fare worse in an earthquake. The Portland Hills fault scenario created greater

[8] The Seismic Rehabilitation Grant Program (SRGP) is a state of Oregon competitive grant program that provides funding for the seismic rehabilitation of critical public buildings, particularly public schools and emergency services facilities.

damages than the Cascade Subduction Zone scenario due primarily to its placement relative to population centers and regional assets; however, at distances 15 or more miles from the Portland Hills fault the damages from the Cascadia Subduction Zone scenario generally were higher. In both the Cascadia Subduction Zone and Portland Hills Fault scenarios it is forecasted that emergency transportation routes will be fragmented, affecting the distribution of goods and services, conditions are worse under the Portland Hills Fault scenario. Portions of the electric distribution system are also expected to be impacted under both scenarios, however, the impact is considerably less than it is to the transportation routes. Additional, capacity or redundancy within the electric distribution network may be beneficial in select areas that are likely to have greater impacts.

Table CA-14 shows the permanent resident population that are vulnerable to injury or death (casualty) and the buildings in the City that are susceptible to liquefaction and landslides, it does not predict that damage will occur in specific areas due to either liquefaction or landslide. More population and property are exposed to higher degrees of expected damage or casualty under the Portland Hills Fault "wet" scenario than in any other scenario.

Table CA-14 Expected damages and casualties for the CSZ fault and Portland Hills fault: earthquake, soil moisture, and event time scenarios

	Cascadia Subduction Zone (M9.0)		Portland Hills Fault (M6.8)	
	"Dry" Soil	"Wet" Saturated Soil	"Dry" Soil	"Wet" Saturated Soil
Number of Buildings	5,559	5,559	5,559	5,559
Building Value ($ Million)	1,890	1,890	1,890	1,890
Building Repair Cost ($ Million)	58	61	159	231
Building Loss Ratio	3%	3%	8%	12%
Debris (Thousands of Tons)	34	36	76	103
Long-Term Displaced Population	78	159	202	874
Total Casualties (Daytime)	38	40	109	172
Level 4 (Killed)	1	1	5	8
Total Casualties (NIghttime)	14	20	41	93
Level 4 (Killed)	0	0	1	2

Source: DOGAMI, Earthquake regional impact analysis for Clackamas, Multnomah, and Washington Counties, Oregon (2018, O-18-02), Tables 12-8, 12-9, 12-10, and 12-11.

Cascadia Subduction Zone Scenario

The City of Canby is expected to have a 3% building loss ratio with a repair cost of $58 million under the CSZ "dry" scenario, and a 3% building loss ratio with a repair cost of $61 million under the CSZ "wet" scenario.[9] The city is expected to have around 38 daytime or 14 nighttime casualties during the CSZ "dry" scenario and 40 daytime or 20 nighttime casualties during the CSZ "wet" scenario. It is expected that there will be a long-term displaced population of around 78 for the CSZ "dry" scenario and 159 for the CSZ "wet" scenario.[10]

Portland Hills Fault Scenario

The City of Canby is expected to have a 8% building loss ratio with a repair cost of $159 million under the CSZ "dry" scenario, and a 12% building loss ratio with a repair cost of $231

[9] DOGAMI, Earthquake regional impact analysis for Clackamas, Multnomah, and Washington Counties, Oregon (2018, O-18-02), Tables 12-8 and 12-9.
[10] Ibid, Tables 12-8 and 12-9.

million under the CSZ "wet" scenario.[11] The long-term displaced population and casualties are greatly increased for all the Portland Hills Fault scenarios. The city is expected to have around 109 daytime or 41 nighttime casualties during the Portland Hills Fault "dry" scenario and 172 daytime or 93 nighttime casualties during the Portland Hills Fault "wet" scenario. It is expected that there will be a long-term displaced population of around 202 for the Portland Hills Fault "dry" scenario and 874 for the Portland Hills Fault "wet" scenario.[12]

Recommendations from the report included topics within Planning, Recovery, Resiliency: Buildings, Resiliency: Infrastructure Improvements, Resiliency: Essential and Critical Facilities, Enhanced Emergency Management Tools, Database Improvements, Public Awareness, and Future Reports. The recommendations of this study are largely incorporated within this NHMPs mitigation strategies (Table CA-1 and Volume I, Section 3). For more detailed information on the report, the damage estimates, and the recommendations see: *Earthquake regional impact analysis for Clackamas, Multnomah, and Washington Counties, Oregon* (2018, O-18-02).

Please review Volume I, Section 2 for additional information on this hazard.

Flood

The HMAC determined that the City's probability for flood is **high** and that their vulnerability to flood is **high**. *The probability rating did not change while the vulnerability rating increased since the previous version of this NHMP addendum.*

Volume I, Section 2 describes the characteristics of flood hazards, history, as well as the location, extent, and probability of a potential event. Figure CA-4 illustrates the flood hazard area for Canby.

Portions of Canby have areas of floodplain (located in the Hazard Overlay Zone). The Federal Emergency Management Agency (FEMA) regulatory floodplains for the Molalla and Willamette Rivers are depicted as relatively narrow areas on each side of the channels. On the Willamette River, the floodway is generally confined within high stream banks. On the Mollala River, the floodways cover a somewhat larger area that is usually located on the outside bank from Canby. Floods can have a devastating impact on almost every aspect of the community, including private property damage, public infrastructure damage, and economic loss from business interruption. It is important for the City to be aware of flooding impacts and assess its level of risk.

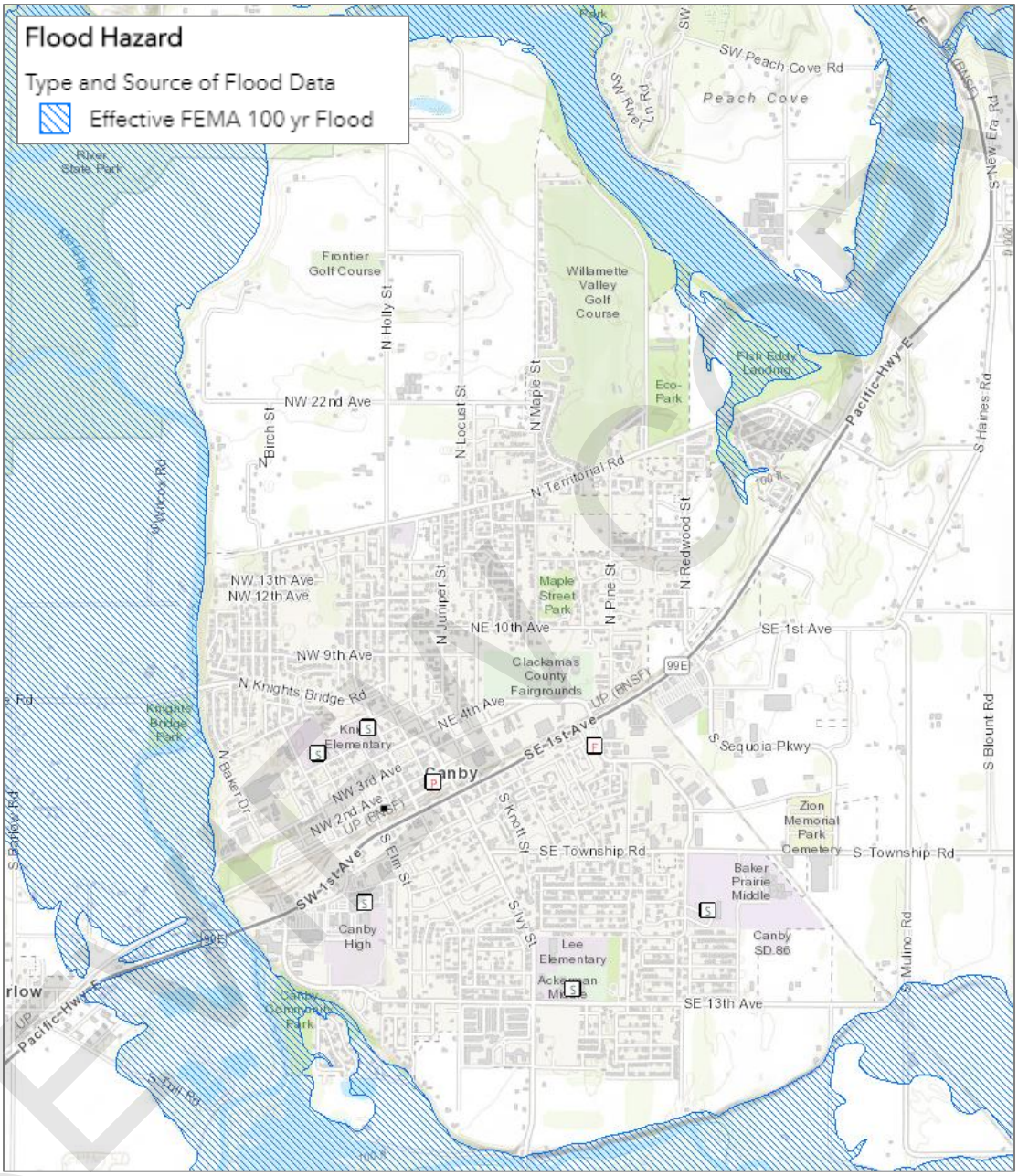
The economic losses due to business closures often total more than the initial property losses that result from flood events. Business owners, and their employees are significantly impacted by flood events. Direct damages from flooding are the most common impacts, but indirect damages, such as diminished clientele, can be just as debilitating to a business.

For mitigation planning purposes, it is important to recognize that flood risk for a community is not limited only to areas of mapped floodplains. Other portions of Canby outside of the mapped floodplains may also be at relatively high risk from over bank flooding from streams too small to be mapped by FEMA or from local storm water drainage. City staff has identified sites where local drainage facilities are taxed during high flows,

[11] Ibid, Tables 12-10 and 12-11
[12] Ibid, Tables 12-10 and 12-11.

especially where open ditches enter culverts or go underground into storm sewers and works to mitigate the stormwater flood risks in these areas (see the City's Stormwater Master Plan for more information).

Figure CA-4 Special Flood Hazard Area



Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)
Note: To view detail click the link above to access Oregon HazVu

The largest flooding event to affect Canby was the February 1996 flood. The high-water level meant tributaries could not drain into the Molalla and Willamette River, which led to

localized flooding on several backed-up creeks. Recently in December 2015, the Molalla River flooded low lying areas around Canby's South Pine Street.[13]

The extent of flooding hazards in Canby primarily depends on climate and precipitation levels. Additionally, withdrawals for irrigation and drinking water, as well as stream and wetland modifications or vegetation removal can influence water flow.

Vulnerability Assessment

Due to insufficient data and resources, Canby is currently unable to perform a quantitative risk assessment for this hazard. However, the City completed an analysis, using the best available data, as a component of the vulnerability assessment in 2009, updated in 2012, and reviewed and updated, as appropriate, in 2018. This analysis looked at identified hazard areas in conjunction with available data on property exposed to the hazard. Exposure of community assets to natural hazards was determined by manually comparing community assets with each hazard and identifying where assets and hazards intersected.

Approximately 4% percent of the total land area in Canby is exposed to the flooding hazard, and in some areas this hazard presents potential life safety hazards. Multi-family housing structures, including Redwood Terrace Apartment Complex and Canby Grove, may be affected by flooding. Critical facilities exposed to the flood hazard include the water treatment facility main river intake structure, the wastewater treatment facility, backwash ponds, and the city's public works facility. In flooding events these facilities may be exposed to high waters and services can be interrupted.

Bridges and culverts are also vulnerable to flooding because debris and sediment can choke culverts and undermine bridges, causing surface water drainage problems. Canby relies on bridges for transportation and connection to other main highways. Canby could potentially be isolated if the bridges were to fail. Knights Bridge and Goods Bridge are particularly exposed. Roadways exposed include S. Ivy (Hwy 170) and SW/SE 1st Ave (Hwy 99E). Disruption to this infrastructure could result in transportation issues, power outages, sewage back-up, and affect overall community and environmental health.

Many older buildings will have difficulty sustaining pressure from flooding events and should be targeted for floodplain retrofitting. For a list of facilities and infrastructure vulnerable to this hazard see the Community Assets section and Tables CA-5 to CA-12.

National Flood Insurance Program (NFIP)

FEMA's Flood Insurance Study (FIS), and Flood Insurance Rate Maps (FIRMs) are effective as of June 17, 2008. Table CA-15 shows that as of July 2018, Canby has 15 National Flood Insurance Program (NFIP) policies in force. Of those, 7 are for properties that were constructed before the initial FIRMs. The last Community Assistance Visit (CAV) for Canby was on November 19, 1993. Canby does not participate in the Community Rating System (CRS).

The table shows that all flood insurance policies are for residential structures, single-family homes. There has been a total of one paid claim for $67,371. The City complies with the NFIP through enforcement of their flood damage prevention ordinance and their floodplain

[13] Wind, rain and floods fill up your Monday (2015). Portland Tribune: Pamplin Media Group.

management program. The Community Repetitive Loss record for Canby identifies no Repetitive Loss (RL) Properties[14] or Severe Repetitive Loss (SRL) Properties[15].

Table CA-15 Flood Insurance Detail

	Clackamas County	Canby
Effective FIRM and FIS	6/17/2008	6/17/2008
InitialFIRM Date	-	6/17/2008
Total Policies	1,957	15
Pre-FIRM Policies	1,086	7
Policies by Building Type		
Single Family	1,761	15
2 to 4 Family	30	0
Other Residential	58	0
Non-Residential	9	0
Minus Rated A Zone	123	0
Insurance in Force	$541,833,400	$4,071,000
Total Paid Claims	590	1
Pre-FIRM Claims Paid	450	1
Substantial Damage Claims	83	0
Total Paid Amount	$20,830,662	$67,371
Repetitive Loss Structures	51	0
Severe Repetitive Loss Properties	4	0
CRS Class Rating	-	NP
Last Community Assistance Visit	-	11/19/1993

Source: Information compiled by Department of Land Conservation, and Development, July 2018.
Note: The portion of the cities of Portland and Tualatin that are within Clackamas County are not included in this table. NP = Not Participating

Mitigation Activities

Canby employs several mitigation strategies to reduce the city's risk to flood events. The city development code includes policies and regulations for flood prone areas including: Surface Waters and Drainage (Chapter 8.12.090), Sewer Use (Chapter 13.16), Flood Hazard Protection (Chapter 15.12), Riparian Overlay Zone (Chapter 16.37), Wetlands Overlay Zone (Chapter 16.39), and Hazard Overlay Zone (Chapter 16.40). The City maintains a Stormwater Master Plan.

[14] A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP.

[15] A Severe Repetitive Loss (SRL) property is a single family property (consisting of 1 to 4 residences) that is covered under flood insurance by the NFIP, and has incurred flood-related damage for which 4 or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000, and with cumulative amount of such claims payments exceeding $20,000; or for which at least 2 separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

Emerald Park is an area designated as open space along the Willamette River. The development of this park has enhanced the wetlands in the area, which will assist in flood water retention. Willow Creek Pump station was completely reconstructed in 2018. Larger capacity storage was installed along with a stand-alone backup generator. Willow Creek wetlands also assist in reducing flood waters by increasing the infiltration capacity of the soils in this area; this has become a public works project area focused on clearing the area weekly.

Please review Volume I, Section 2 for additional information on this hazard.

Landslide

The HMAC determined that the City's probability for landslide is **low** and that their vulnerability to landslide is **low**. *The probability rating decreased, and the vulnerability rating did not change, since the previous version of this NHMP addendum.*

Volume I, Section 2 describes the characteristics of landslide hazards, history, as well as the location, extent, and probability of a potential event within the region. Although catastrophic landslides have not occurred in Canby, steep slopes do exist along the banks of the Molalla River, and extends south from 6th Street up to the northern city limits. Highway 99E, north of Canby, is especially vulnerable to landslide with multiple incidents of rock slides shutting down lanes in 2007, 2010, and 2015. As example, on January 7, 2009 two slides occurred in private yards after an intense winter storm. About three feet of earth fell 30 to 50 feet from the back yard of a home on North Baker Drive. Another home on Alder Creek Lane in Knights Bridge Estates lost approximately 10 feet of its back yard.

Landslide susceptibility exposure for Canby is shown in Figure CA-5. Most of Canby demonstrates a low to moderate landslide susceptibility exposure. Approximately 2% of Canby has very high or high, and approximately 9% moderate, landslide susceptibility exposure.[16] However, most of the areas that are identified to exhibit dangerous potential rapidly moving landslides are vacant and often preserved in wooded and dedicated open space. *Note that even if a jurisdiction has a high percentage of area in a high or very high landslide exposure susceptibility zone, this does not mean there is a high risk, because risk is the intersection of hazard, and assets.*

Vulnerability Assessment

Due to insufficient data and resources, Canby is currently unable to perform a quantitative risk assessment for this hazard. However, DOGAMI completed a statewide landslide susceptibility assessment in 2016 (O-16-02), general findings from that report are provided above and within Figure CA-5. Additionally, the City completed an analysis, using the best available data, as a component of the vulnerability assessment in 2009, updated in 2012, and reviewed and updated, as appropriate, in 2018. This analysis looked at identified hazard areas in conjunction with available data on property exposed to the hazard. Exposure of community assets to natural hazards was determined by manually comparing community assets with each hazard and identifying where assets and hazards intersected.

[16] DOGAMI. Open-File Report, O-16-02, *Landslide Susceptibility Overview Map of Oregon* (2016)

Figure CA-5 Landslide Susceptibility Exposure

Low	**Landsliding unlikely.** Areas classified as Landslide Density = Low (less than 7%) and areas classified as Slopes Prone to Landsliding = Low.
Moderate	**Landsliding possible.** Areas classified as Landslide Density = Low to Moderate (less than 17%) and areas classified as Slopes Prone to Landsliding = Moderate OR areas classified as Landslide Density = Moderate (7%-17%) and areas classified as Slopes Prone to Landsliding = Low.
High	**Landsliding likely.** Areas classified as Landslide Density = High (greater than 17%) and areas classified as Slopes Prone to Landsliding = Low and Moderate OR areas classified as Landslide Density = Low and Moderate (less than 17%) and areas classified as Slopes Prone to Landsliding = High.
Very High	**Existing landslides** Landslide Density and Slopes Prone to Landsliding data were not considered in this category. Note: the quality of landslide inventory (existing landslides) mapping varies across the state.

Source: Oregon HazVu: Statewide Geohazards Viewer (DOGAMI)
Note: To view detail click the link above to access Oregon HazVu

Two critical facilities are exposed to the landslide hazard —Canby Utility's main river intake, Springs Gallery, and pump houses as well as the Police Department (EOC #2). The critical infrastructure is especially exposed to the landslide hazard. In addition, economic centers, cultural or historic assets, environmental assets, and hazardous material sites are exposed to the landslide hazard. Hazardous materials sites would also suffer damage, resulting in threats to environmental and human health, while disrupting the availability of gasoline for vehicle transport and furthering economic loss because such sites are also sources of employment. For a list of facilities and infrastructure vulnerable to this hazard see the Community Assets section and Tables CA-5 to CA-12.

This exposure means that large scale and simultaneous landslides triggered by an earthquake could substantially disrupt City operations buildings, police, fire stations and key pieces of infrastructure (bridges, sewage pump stations, water reservoirs) that would hinder the ability of the City to respond to emergency situations created by such an event.

As a result, it will be important for the City to pursue opportunities for retrofitting and mitigating important structures and infrastructure, such that said facilities can withstand and survive landslides, particularly simultaneous landslides generated by an earthquake. Business continuity planning shall also be an important factor, given the number of economic centers and employment facilities that are threatened by the landslide hazard.

Potential landslide-related impacts are adequately described within Volume I, Section 2, and include infrastructure damages, economic impacts (due to isolation, and/or arterial road closures), property damages, and obstruction to evacuation routes. Rain-induced landslides, and debris flows can potentially occur during any winter, and thoroughfares beyond City limits are susceptible to obstruction as well.

The most common type of landslides are slides caused by erosion. Slides move in contact with the underlying surface, are generally slow moving, and can be deep. Rainfall-initiated landslides tend to be smaller; while earthquake induced landslides may be quite large. All soil types can be affected by natural landslide triggering conditions.

Mitigation Activities

Canby works to mitigate future landslide hazards. The city development code includes several policies and regulations to protect slopes including the Flood Hazard Protection (Chapter 15.12), Erosion Control (Chapter 15.20), Hazard Overlay Zone (Chapter 16.40), and Building Height, Subdivision Design Standards (Chapter 16.64). The City has identified steep slopes that may be susceptible to the landslide hazards. In 2007 Canby Public Works abandoned a storm line that had gone over a hill on North Baker Drive. This storm line was rerouted out of the hazard zone to reduce the possibilities of future damage due to landslides.

Please review Volume I, Section 2 for additional information on this hazard.

Severe Weather

Severe weather can account for a variety of intense, and potentially damaging hazard events. These events include extreme heat, windstorms, and winter storms. The following section describes the unique probability, and vulnerability of each identified weather hazard.

Extreme Heat

The HMAC determined that the City's probability for extreme heat events is **moderate** and that their vulnerability is **moderate**. *The probability rating and the vulnerability rating did not change since the previous version of this NHMP addendum.*

Volume I, Section 2 describes the characteristics of extreme heat, history, as well as the location, extent, and probability of a potential event within the region. Generally, an event that affects the County is likely to affect the City as well.

A severe heat episode or "heat wave" occurs about every two to three years, and typically lasting two to three days but can last as many as five days. A severe heat episode can be defined as consecutive days of upper 90s to around 100. Severe heat hazard in the Portland metro region can be described as the average number of days with temperatures greater than or equal to 90-degrees, or 100-degrees, Fahrenheit. On average the region experiences 13.6 days with temperatures above 90-degrees Fahrenheit, and 1.4 days above 100-degrees Fahrenheit, based on new 30-year climate averages (1981-2010) from the National Weather Service – Portland Weather Forecast Office.

The City of Canby has not experienced any life-threatening consequences from the few historical extreme heat events, although changes in climate indicate that the area should expect to see more extreme heat events.

Please review Volume I, Section 2 for additional information on this hazard.

Windstorm

The HMAC determined that the City's probability for windstorm is **high** and that their vulnerability to windstorm is **moderate**. *The probability and vulnerability ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 2 describes the characteristics of windstorm hazards, history, as well as the location, extent, and probability of a potential event within the region. Because windstorms typically occur during winter months, they are sometimes accompanied by flooding and winter storms (ice, freezing rain, and very rarely, snow). Other severe weather events that may accompany windstorms, including thunderstorms, hail, lightning strikes, and tornadoes are generally negligible for Canby. In July 2016, two funnel clouds were spotted due to a low-pressure system and no damage was reported. While five miles east of Canby, a tornado touched down at Aurora State Airport in October of 2017.

Volume I, Section 2 describes the impacts caused by windstorms, including power outages, downed trees, heavy precipitation, building damages, and storm-related debris. Additionally, transportation, and economic disruptions result as well.

Damage from high winds generally has resulted in downed utility lines, and trees usually limited to several localized areas. Electrical power can be out anywhere from a few hours to several days. Outdoor signs have also suffered damage. If the high winds are accompanied by rain (which they often are), blowing leaves, and debris clog drainage-ways, which in turn may cause localized urban flooding.

Please review Volume I, Section 2 for additional information on this hazard.

Winter Storm (Snow/Ice)

The HMAC determined that the City's probability for winter storm is **high** and that their vulnerability to winter storm is **moderate**. *The probability and vulnerability ratings did not change since the previous version of this NHMP addendum.*

Volume I, Section 2 describes the characteristics of winter storm hazards, history, as well as the location, extent, and probability of a potential event within the region. Severe winter storms can consist of rain, freezing rain, ice, snow, cold temperatures, and wind. They originate from troughs of low pressure offshore that ride along the jet stream during fall, winter, and early spring months. Severe winter storms affecting the City typically originate in the Gulf of Alaska or in the central Pacific Ocean. These storms are most common from November through March.

Most winter storms typically do not cause significant damage, they are frequent, and have the potential to impact economic activity. Road closures due to winter weather are an uncommon occurrence but can interrupt commuter and commercial traffic.

Vulnerability Assessment

Due to insufficient data and resources, Canby is currently unable to perform a quantitative risk assessment, or exposure analysis, for the extreme heat, windstorm, and winter storm hazards. However, the City completed an analysis, using the best available data, as a component of the vulnerability assessment in 2009, updated in 2012, and reviewed and updated, as appropriate, in 2018. This analysis looked at identified hazard areas in conjunction with available data on property exposed to the hazard. Exposure of community assets to natural hazards was determined by manually comparing community assets with each hazard and identifying where assets and hazards intersected.

The areas of the City that are often most at risk to severe storms are residential areas on steeper slopes, where roads may be icy and, thus, difficult to climb and descend. Road corridors leading to residential areas with fuller tree canopies are susceptible to downed tree limbs, and those areas that are above 500 feet in elevation are particularly vulnerable. However, some weather systems are characterized by a temperature inversion, where the valley floor is colder than the nearby hills. Consequently, severe storms affect the entire city.

The major risk to property results from exposed utilities, especially power lines and water pipes that are damaged by wind, broken tree limbs and cold temperatures. Businesses also suffer economic losses when they must close as the result of the inclement weather and/or the loss of power, which, in turn, disrupts the local supply chain of goods and services. Periods of extended ice coverage hinder emergency response services and limit the mobility of residents, which could result in serious life safety issues.

Residents and businesses that are in areas that exhibit the severe storm hazard face some risk of damage from severe storms. Severe weather events are expected to impact nearly all City residents.

Telcom Central Station and City Hall Complex are critical facilities located adjacent to vulnerable power lines. Canby Utility, Public Works, and Canby Telephone would be strained during a severe storm event as they work to clear roads and repair or replace power distribution and/or transmission lines and maintain telephone lines for communication.

Additionally, the area along 99E from South Elm to South Ivy St. is particularly vulnerable to damaged power lines from fallen tree limbs.

All schools and one adult community center that are considered essential facilities are also exposed to the severe weather hazards. In addition, critical infrastructure, economic centers, cultural or historic assets, environmental assets, and hazardous material sites are exposed to the severe weather hazards. For a list of facilities and infrastructure vulnerable to these hazards see the Community Assets section and Tables CA-5 to CA-12.

The exposure of these facilities and infrastructure means that severe weather events could substantially disrupt the operations of City government buildings and fire stations, impairing key City functions, while hindering the ability of emergency response personnel to respond to emergency situations that are created by a severe storm event.

All these facilities depend upon utility lines, roads and bridges to operate and perform their respective important functions within the City. Exposed utility and power lines are particularly vulnerable to damage from severe winter storms by wind, ice and snow. More hardened infrastructure, like bridges and roads, can sustain a severe winter storm, but during the event, they are often hazardous to traverse because of icy, windy and snowy conditions.

Consequently, severe weather (wind or winter storm) could substantially disrupt numerous key resources and facilities within the City through impediments to the transportation system and damage to the power grid. Among other things, these transportation problems and power failures disrupt business operations and educational facilities, resulting in economic losses and halting educational opportunities.

Power to Hazardous material sites could also disrupted. The sites themselves could be damaged or rendered inaccessible. In turn, these conditions could pose threats to the natural environment of the City and the health of its population, while disrupting the availability of gasoline for vehicle transport and furthering economic losses.

As a result, it will be important for the City to pursue opportunities for undergrounding utilities and retrofitting utility lines so that they may withstand cold weather conditions without freezing and bursting. Adhering to current building codes for weatherization of structures, as well as current engineering and fire codes that pertain to the steepness of new roads, are also key factors for the City to consider. Business continuity planning shall also be an important factor, given the number of economic centers and employment facilities that are threatened by the severe storm hazard.

Mitigation Activities

Mitigating severe weather can be difficult because storms affect all areas of the city, but Canby has made progress to reduce the effects of storms. Canby has a tree inventory and street tree regulation through the Development code's Tree Regulations section (Chapter 12). Canby Utility undergrounds all new facilities so they are not susceptible to fallen branches and ice buildup. Canby also has a designated snow plow and sanding routes to help expedite snow removal.

Please review Volume I, Section 2 for additional information on this hazard.

Volcanic Event

The HMAC determined that the City's probability for a volcanic event is **low** and that their vulnerability to a volcanic event is **low**. *The probability rating and the vulnerability rating decreased since the previous version of this NHMP addendum.*

Volume I, Section 2 describes the characteristics of volcanic hazards, history, as well as the location, extent, and probability of a potential event within the region. Generally, an event that affects the western portion of the County is likely to affect Canby as well. Several volcanoes are located near Canby, the closest of which are Mount Hood, Mount Adams, Mount Saint Helens, Mount Rainier, and the Three Sisters.

Vulnerability Assessment

Due to insufficient data and resources, Canby is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard. For a list of facilities and infrastructure vulnerable to this hazard see the Community Assets section and Tables CA-5 to CA-12.

Due to Canby's relative distance from volcanoes, the city is unlikely to experience the immediate effects that eruptions have on surrounding areas (i.e., mud and debris flows, or lahars). Depending on wind patterns and which volcano erupts, however, the city may experience ashfall. The eruption of Mount St. Helens in 1980, for example, coated the Willamette Valley with a fine layer of ash. If Mount Hood erupts, however, the city could experience a heavier coating of ash.

Mitigation Activities

The existing volcano hazard mitigation activities are conducted at the county, regional, state, and federal levels and are described in the Clackamas County NHMP.

Please review Volume I, Section 2 for additional information on this hazard.

Wildfire

The HMAC determined that the City's probability for wildfire is **low**, and that their vulnerability to wildfire is **moderate**. *The probability rating decreased, and the vulnerability rating did not change, since the previous version of this NHMP addendum.*

The 2017 Clackamas County Community Wildfire Protection Plan (CWPP) was completed in May 2018. The CWPP is hereby incorporated into this NHMP addendum by reference, and it will serve as the wildfire section for this addendum. The following presents a summary of key information; refer to the full CWPP for a complete description, and evaluation of the wildfire hazard: https://www.clackamas.us/dm/CWPP.html. Information specific to Canby is found in the following chapter: Chapter 10.2: Canby Rural Fire Protection District #62.

Volume I, Section 2 describes the characteristics of wildland fire hazards, history, as well as the location, extent, and probability of a potential event within the region. The location, and extent of a wildland fire vary depending on fuel, topography, and weather conditions. Weather, and urbanization conditions are primarily at cause for the hazard level. Canby has not experienced a catastrophic wildfire within City limits.

Clackamas County has two major physiographic regions: the Willamette River Valley in western Clackamas County and the Cascade Range Mountains in eastern and southern

Clackamas County. The Willamette River Valley, which includes Canby, is the most heavily populated portion of the county and is characterized by flat or gently hilly topography. The Cascade Range has a relatively small population and is characterized by heavily forested slopes. Eastern Clackamas County is at higher risk to wildfire than western portions of the county due to its dense forest land. Human caused fires are responsible for most fires in Clackamas County.

The City is characterized by lush parks, neighborhoods surrounded by mature trees and under story vegetation and development intermingled with the natural landscape. One area of wildland-urban interface is the northeast portion of Canby. A heavily wooded area borders the north and south boundaries of the sewage treatment facility and Public Works Building (EOC #3). Most of the woodlands are surrounded by urban development that are a concern in the case of a wildfire event. Figure CA-6 shows overall wildfire risk in Canby. The forested hills within, and surrounding Canby are interface areas including the following High Priority Communities at Risk (CARs): Adkins Circle, Dutch Vista/Madrona, Public Works Infrastructure, Sundowner, and the following Medium Priority CARs: N Side Molalla River Bluff, Molalla River State Park, and South End.[17]

Most of the city has less severe (moderate or less) wildfire burn probability that includes expected flame lengths less than four-feet under normal weather conditions, except in a small wooded area new the Willamette River on North Holly Street that has the probability of four to eight feet expected flame lengths.[18] However, conditions vary widely and with local topography, fuels, and local weather (including wind) conditions. Under warm, dry, windy, and drought conditions expect higher likelihood of fire starts, higher intensity, more ember activity, and a more difficult to control wildfire that will include more fire effects and impacts.

Vulnerability Assessment

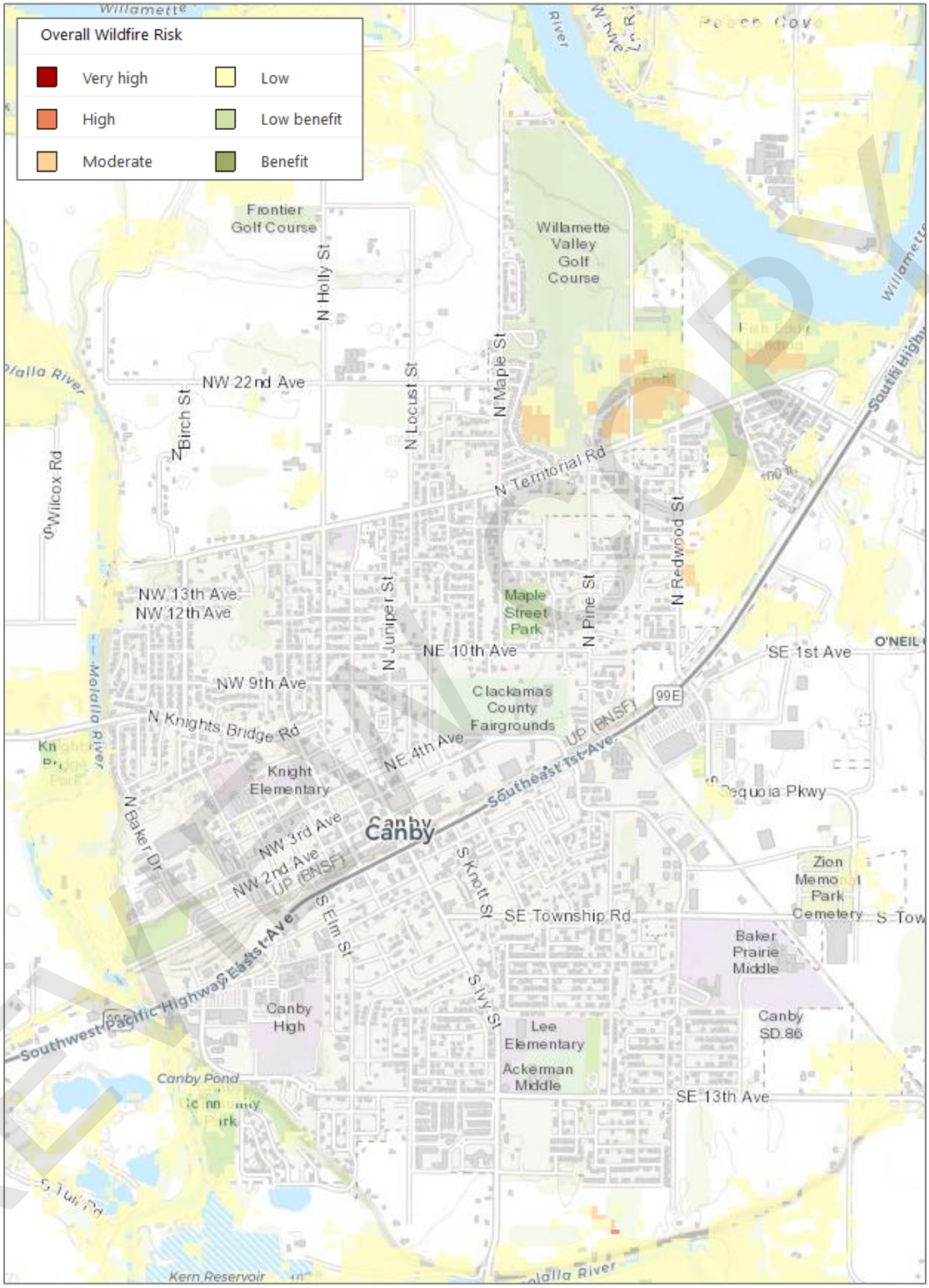
Due to insufficient data and resources, Canby is currently unable to perform a quantitative risk assessment, or exposure analysis, for this hazard. However, the City completed an analysis, using the best available data, as a component of the vulnerability assessment in 2009, updated in 2012, and reviewed and updated, as appropriate, in 2018. This analysis looked at identified hazard areas in conjunction with available data on property exposed to the hazard. Exposure of community assets to natural hazards was determined by manually comparing community assets with each hazard and identifying where assets and hazards intersected.

Residences and businesses that border occluded woodlands with slopes greater than 25% are at the greatest risk of loss or damage from wildfires. A great deal of infrastructure is exposed to the wildfire hazard, including Canby's primary water source, water treatment facilities, and Public Works Building (EOC#3). This could affect the efficiency of fire protection professionals during a large-scale wildfire. Vegetation along roadways is also highly dangerous, as negligent motorists provide ignition sources by tossing cigarette butts out car windows. A variety of historic landmarks are also included in the high wildfire zones.

[17] Clackamas County Community Wildfire Protection Plan, *Canby Rural Fire Protection District #62* (2018), Table 10.13-1.

[18] Oregon Wildfire Risk Explorer, date accessed April 26, 2019.

Figure CA-6 Overall Wildfire Risk



Source: Oregon Wildfire Risk Explorer, date accessed November 9, 2018.

For a list of facilities and infrastructure vulnerable to this hazard see the Community Assets section and Tables CA-5 to CA-12.

The potential community impacts, and vulnerabilities described in Volume I, Section 2 are generally accurate for the City as well. Canby's fire response is addressed within the CWPP which assesses wildfire risk, maps wildland urban interface areas, and includes actions to mitigate wildfire risk. The City will update the City's wildfire risk assessment if the fire plan presents better data during future updates.

Property can be damaged or destroyed with one fire as structures, vegetation, and other flammables easily merge to become unpredictable, and hard to manage. Other factors that affect ability to effectively respond to a wildfire include access to the location, and to water, response time from the fire station, availability of personnel, and equipment, and weather (e.g., heat, low humidity, high winds, and drought).

Mitigation Activities

The City and Canby Fire District use several mitigation tools to reduce the city's risk to wildfires. Canby Fire District provides emergency fire suppression, medical response and rescue services to the cities of Canby and Barlow and other rural areas around those cities under an intergovernmental agreement related to voter-approved annexation to the district. Canby Fire District has 50 members who consist of 18 career, 30 volunteer, and 2 administrative personnel. Mutual aid agreements with neighboring jurisdictions are also in place. Water supply and storage capacity in Canby conforms with recommended fire flow requirements.

The Canby Fire District provides outreach and education to the community on wildfire mitigation via news releases, posters, signage, website messages, and visits to schools, civic organizations and neighborhood associations.

Please review the 2017 Clackamas County Community Wildfire Protection Plan (CWPP) and Volume I, Section 2 for additional information on this hazard.

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ATTACHMENT A: ACTION ITEM FORMS

ATTACHMENT A

** - Priority Action Items*

Note: The HMAC decided to modify the prioritization of action items in this update to reflect current conditions (risk assessment), needs, and capacity.

Summary of Action Changes

Below is a list of changes to the action items since the previous plan.

Previous NHMP Actions: Completed

Flood Action #3 (2012): "Identify mitigation strategies to address flooding issues in the bottom lands" is considered complete. The water wash ponds were elevated above the flood line. The water intake structures are elevated out of the 100-year floodplain. Canby Utility continues to address flooding issues as they arise.

See 2018 status identified in each action for activities that have been completed since the previous plan.

Previous NHMP Actions: Removed

Multi-Hazard Action #5 (2012): "Improve the hazard assessment in the Canby Natural Hazard Mitigation Plan" was removed from the list since it was determined by the steering committee that this is a duplication of the purpose of the NHMP's implementation and maintenance and five-year update requirements.

Multi-Hazard Action #6 (2012): "Identify and pursue funding opportunities to develop and implement hazard mitigation activities" was removed from the list since it was determined by the steering committee that this is a duplication of the purpose of the NHMP's implementation and maintenance requirements.

Note: 2012 Action MH #7 was renumbered to 2019 Action MH #5.

New NHMP Actions (2019):

- Wildfire Action #2

See action item forms below for detail.

Action Item Forms

Each action item has a corresponding action item worksheet describing the activity, identifying the rationale for the project, identifying potential ideas for implementation, and assigning coordinating and partner organizations. The action item worksheets can assist the community in pre-packaging potential projects for grant funding. The worksheet components are described below.

ALIGNMENT WITH EXISTING PLANS/POLICIES

The Clackamas County NHMP includes a range of action items that, when implemented, will reduce loss from hazard events in the County, participating cities, and special districts. Within the plan, FEMA requires the identification of existing programs that might be used to implement these action items. The City addresses statewide planning goals and legislative requirements through its comprehensive land use plan, capital improvements plan, mandated standards and building codes. To the extent possible, the City will work to incorporate the recommended mitigation action items into existing programs and procedures. Each action item identifies related existing plans and policies.

STATUS/RATIONALE FOR PROPOSED ACTION ITEM

Action items should be fact-based and tied directly to issues or needs identified throughout the planning process. Action items can be developed at any time during the planning process and can come from several sources, including participants in the planning process, noted deficiencies in local capability, or issues identified through the risk assessment. The rationale for proposed action items is based on the information documented in Section 2. The worksheet provides information on the activities that have occurred since the previous plan for each action item.

IDEAS FOR IMPLEMENTATION

The ideas for implementation offer a transition from theory to practice and serve as a starting point for this plan. This component of the action item is dynamic, since some ideas may prove to not be feasible, and new ideas may be added during the plan maintenance process. Ideas for implementation include such things as collaboration with relevant organizations, grant programs, tax incentives, human resources, education and outreach, research, and physical manipulation of buildings and infrastructure.

COORDINATING (LEAD) ORGANIZATION:

The coordinating organization is the public agency with the regulatory responsibility to address natural hazards, or that is willing and able to organize resources, find appropriate funding, or oversee activity implementation, monitoring and evaluation.

INTERNAL AND EXTERNAL PARTNERS:

The internal and external partner organizations listed in the Action Item Worksheets are potential partners recommended by the project HMAC but not necessarily contacted during the development of the plan. The coordinating organization should contact the identified partner organizations to see if they are capable of and interested in participation. This initial contact is also to gain a commitment of time and/or resources toward completion of the action items.

Internal partner organizations are departments within the City or other participating jurisdiction that may be able to assist in the implementation of action items by providing relevant resources to the coordinating organization.

External partner organizations can assist the coordinating organization in implementing the action items in various functions and may include local, regional, state, or federal agencies, as well as local and regional public and private sector organizations.

PLAN GOALS ADDRESSED:

The plan goals addressed by each action item are identified as a means for monitoring and evaluating how well the mitigation plan is achieving its goals, following implementation.

TIMELINE:

All broad scale action items have been determined to be ongoing, as opposed to short-term (0 to 2 years) or long-term (3 or more years). This is because the action items are broad ideas, and although actions may be implemented to address the broad ideas, the efforts should be ongoing.

POTENTIAL FUNDING SOURCE

Where possible potential funding sources have been identified. Example funding sources may include: Federal Hazard Mitigation Assistance programs, state funding sources such as the Oregon Seismic Rehabilitation Grant Program, or local funding sources such as capital improvement or general funds. An action item may include several potential funding sources.

ESTIMATED COST

A rough estimate of the cost for implementing each action item is included. Costs are shown in general categories showing low, medium, or high cost. The estimated cost for each category is outlined below:

Low - Less than $50,000
Medium - $50,000 – $100,000
High - More than $100,000

Multi-Hazard #1*

Proposed Action Item:	Alignment with Plan Goals:
Update and revise the Canby Emergency Operations Plan.	Protect Life and Property; Augment Emergency Services; Encourage Partnerships for Implementation

Alignment with Existing Plans/Policies:
Canby Emergency Operations Plan; Comprehensive Plan
2018 Status/Rationale for Proposed Action Item:
• The EOP was last updated in February 2012.
Ideas for Implementation:
• Assign appropriate city staff to lead the EOP update process; and • Work with the contractor hired by the State of Oregon to update the EOP

Coordinating Organization:	Canby Fire District

Internal Partners:	External Partners:
City of Canby	

Potential Funding Sources:	Estimated cost:	Timeline:
General fund, operating budgets	Low	X Short Term (0-2 years) ☐ Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing action item
Priority:	High Priority

** - High Priority Action Item*

Multi-Hazard #2*

Proposed Action Item:	Alignment with Plan Goals:
Ensure there are adequate shelter facilities in hazard-free zones to serve Canby residents. Identify potential shelter sites and evaluate their relative structural risks/structural deficiencies. Seek funding for upgrades on shelter sites if needed.	Protect Life and Property; Augment Emergency Services; Encourage Partnerships for Implementation

Alignment with Existing Plans/Policies:

2018 Status/Rationale for Proposed Action Item:
• The 2009 update included evaluating the structural integrity of shelters and seeking funding for upgrades. The city maintains an active inventory of all shelters.

Ideas for Implementation:
• Identify and contact non-Red Cross potential shelter sites to ensure they are structurally suitable under disaster scenarios; • Obtain funding to enhance the resilience of emergency shelter sites; and • Contact Red Cross shelter sites to renew and maintain agreements annually.

Coordinating Organization:	Hazard Mitigation Advisory Committee

Internal Partners:	External Partners:
Public Works, Planning, Building	Red Cross

Potential Funding Sources:	Estimated cost:	Potential Funding Sources:
General Fund	Low	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing action item
Priority:	High Priority

** - High Priority Action Item*

Multi-Hazard #3*

Proposed Action Item:	Alignment with Plan Goals:
Develop, enhance, and implement education programs designed to reduce the losses from natural hazards.	Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships for Implementation; Promote Public Awareness

Alignment with Existing Plans/Policies:

2018 Status/Rationale for Proposed Action Item:

- The county fair (Canby Fairgrounds) includes a "Safety Street" where police, fire, the forestry department, and other service organizations provide information on safety, preparedness, mitigation tips, etc. Canby Fire District educates youth on fire prevention and safety in schools and have "Fireman Troy" and "Hotshot the Cougar" mascots to assist in educating. The Fire District website provides information on fire prevention and mitigation. Canby Utility promotes vegetation management in their newsletters. The City of Canby puts out notices in their newsletters on preparedness for bad weather and tips on reducing damages. Canby School District educates students on earthquakes and practices earthquake drills. Canby Utility works with the Molalla River Alliance in river protection activities.

Ideas for Implementation:

- Gather hazard-related information and public information materials, and disseminate to public through local publications;
- Identify property owners in hazard zones, and conduct a target mailing to disseminate hazard information;
- Publicize hazard information as the seasons for the hazards approach. These include earthquake awareness month in April, wildfire prevention in summer, and flood and severe storm information in winter;
- Hold a community meeting with the neighbors along the steep slopes of the Molalla River, and in identified landslide areas. Provide them with the proper contacts and resources for dealing with erosion control and slope stabilization on their property. Educate them on mitigation practices they can employ to better protect their property.

Coordinating Organization:	Hazard Mitigation Advisory Committee

Internal Partners:	External Partners:
Canby Fire District, Canby Utility, Administration	FEMA, OEM, Canby School District, Molalla River Alliance

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund, operating budgets	Low	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing action item
Priority:	High Priority

** - High Priority Action Item*

Multi-Hazard #4*

Proposed Action Item:	Alignment with Plan Goals:
Integrate the goals and action items from the Canby Natural Hazards Mitigation Plan into existing regulatory documents and programs, where appropriate.	Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships for Implementation; Promote Public Awareness

Alignment with Existing Plans/Policies:
Comprehensive Plan; Development Code; Zoning Ordinance; Natural Hazards Mitigation Plan

2018 Status/Rationale for Proposed Action Item:
• The development code was last updated in 2013 (amended 2015, 2016, 2018). • The Comprehensive Plan was last updated in 2015. • The Stormwater Master Plan was last updated in 2013. • The city utilizes the latest Oregon Building Code.

Ideas for Implementation:
• Use the mitigation plan to help the city's Comprehensive Land Use Plan meet State Land Use Planning Goal 7, designed to protect life and property from natural disasters and hazards through planning strategies that restrict development in areas of known hazards; • Integrate the city's mitigation plan into current capital improvement plans to ensure that development does not encroach on known hazard areas; • Partner with other organizations and agencies with similar goals to promote building codes that are more disaster resistant at the state level; and • Incorporate the Canby Mitigation Plan into deed restrictions and conditions of approval where appropriate.

Coordinating Organization:	Hazard Mitigation Advisory Committee

Internal Partners:	External Partners:
Planning, Public Works	DOGAMI, DLCD, FEMA

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund	Low	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing action item
Priority:	High Priority

** - High Priority Action Item*

Multi-Hazard #5

Proposed Action Item:	Alignment with Plan Goals:
Identify, plan, and establish an alternate potable water source on the Willamette River.	Protect Life and Property; Enhance Natural Systems; Encourage Partnerships for Implementation; Promote Public Awareness

Alignment with Existing Plans/Policies:
Comprehensive Plan, Development Code, Zoning Ordinance, Water System Master Plan

2018 Status/Rationale for Proposed Action Item:
• The City of Canby potable water source is primarily reliant on Molalla River flows. As part of a long term plan, Canby Utility is working to establish a water treatment facility reliant on the Willamette River. • As Canby continues to grow, additional potable water may be needed to meet the needs of the community. • Groundwater in the area does not appear to be a viable alternative.

Ideas for Implementation:
• Coordinating efforts between other surrounding cities who can also benefit. • Strategy work and early planning stages for determining a location for the transmission line and intake system. • Utilize the website to post information regarding drought.

Coordinating Organization:	Canby Utility

Internal Partners:	External Partners:
Public Works, Hazard Mitigation Advisory Committee	Other cities/agencies

Potential Funding Sources:	Estimated cost:	Timeline:
General fund	Moderate	X Short Term (0-2 years) ☐ Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing action item
Priority:	Medium Priority

Earthquake #1

Proposed Action Item:	Alignment with Plan Goals:
Conduct seismic evaluations and upgrades on identified critical and essential facilities and infrastructure for implementing appropriate structural and non-structural mitigation strategies.	Protect Life and Property; Augment Emergency Services; Encourage Partnerships for Implementation

Alignment with Existing Plans/Policies:
Capital Improvement Plan; Comprehensive Plan
2018 Status/Rationale for Proposed Action Item:
• The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that are being considered by the community to reduce the effect that natural hazards will have on the community [201.6(c)(3)(ii)]. Developing and implementing programs to reduce the potential for earthquakes to cause damage can assist a community in mitigating its overall risk to earthquakes. • Pre-disaster mitigation strategies will reduce post-disaster response needs by lessening life loss, injury, damage, and disruption. • City buildings, fire stations, police station and schools were seismically evaluated. The Canby Telcom control center was earthquake retrofitted. The Police Department and the 13th Ave. Reservoir were completed in 2012. Canby Fire District Station #62 retrofit per SRGP grant.
Ideas for Implementation:
• Obtain funding to perform seismic evaluations; • Conduct seismic evaluations on identified community assets (including shelters) for implementing appropriate structural and non-structural mitigation strategies; • Prioritize seismic upgrades based on criticality of need and population served; • Seismically retrofit critical government facilities to guarantee continuous operation during and after a natural disaster; • Coordinate with agencies responsible for maintaining the bridges surrounding Canby to upgrade them to meet current seismic code; • Partner with appropriate organizations to implement seismic upgrades; and • Create damage assessment procedures.

Coordinating Organization:	Hazard Mitigation Advisory Committee

Internal Partners:	External Partners:
Administration, Planning, Public Works, Police, Canby Fire District, Canby Utility	DOGAMI, School District

Potential Funding Sources:	Estimated cost:	Potential Funding Sources:
General Fund, Seismic Rehabilitation Grant Program, Hazard Mitigation Assistance Grants, Utility Funds	Low to High	☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing action item
Priority:	Medium Priority

Flood #I

Proposed Action Item:	Alignment with Plan Goals:
Evaluate and upgrade surface water management infrastructure and identify appropriate mitigation strategies.	Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships for Implementation

Alignment with Existing Plans/Policies:

Surface Water Master Plan, Zoning Code, FEMA FIRMs, Comprehensive Plan, Capital Improvement Plan

2018 Status/Rationale for Proposed Action Item:

- The storm water master plan was updated in 2013. The city received a grant for developing new subdivision design standards for surface water, and another grant to address the flooding problem near the library. The city of Canby has received money to upgrade the storm system to reduce floods. They are currently working to upgrade the system by putting in new streets and pervious pavement. The city continues to mitigate floods by removing beaver dam debris. The city has a full-time vacuum sweeper, so the catch basins don't have to be cleaned as often. The storm system on Baker has been updated.
- The Stormwater CIP is currently being reviewed and updated – expected complete 2019-20.

Ideas for Implementation:

- Develop storm water grate management system to keep grates open and clear of debris; and
- Implement the actions stated in the storm water master plan to address areas of known flooding.

Coordinating Organization:	Public Works

Internal Partners:	External Partners:
Planning, Administration	Clackamas County Water Environment Services, METRO, Department of Environmental Quality, Department of Land Conservation and Development, Department of State Lands

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund, Environmental Fund, City Stormwater Fund	Moderate to High	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium Priority

Flood #2*

Proposed Action Item:	Alignment with Plan Goals:
Ensure continued compliance in the National Flood Insurance Program (NFIP) through enforcement of local floodplain management ordinances.	Protect Life and Property; Enhance Natural Systems; Encourage Partnerships for Implementation; Promote Public Awareness

Alignment with Existing Plans/Policies:

Flood Ordinance; Zoning Code, FEMA FIRMs, Comprehensive Plan

2018 Status/Rationale for Proposed Action Item:

- The Disaster Mitigation Act of 2000 requires communities to identify mitigation actions that address new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Continued participation in the NFIP will help reduce the level of flood damage to new and existing buildings in communities while providing homeowners, renters and business owners additional flood insurance protection.
- The NFIP provides communities with federally backed flood insurance to homeowners, renters, and business owners, if communities develop and enforce adequate floodplain management ordinances. The benefits of adopting NFIP standards for communities are a reduced level of flood damage in the community and stronger buildings that can withstand floods.
- The city complies with the NFIP through enforcement of their flood hazard protection ordinance (Ord. 1279, 20008). Flood mitigation projects are routinely completed as part of their storm water master plan CIP (see FL #1 for more detail).

Ideas for Implementation:

- Actively participate with DLCD and FEMA during Community Assistance Visits.
- Assess the floodplain ordinances to ensure they reflect current flood hazards and situations and meet NFIP requirements.
- Coordinate with the county to ensure that floodplain ordinances and NFIP regulations are maintained and enforced.
- Consider participating in the National Flood Insurance Program's Community Rating System (CRS). CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
Public Works	Department of Land Conservation and Development; Association of State Floodplain Managers

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund	Low	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	High Priority

** - High Priority Action Item*

Landslide #1

Proposed Action Item:	Alignment with Plan Goals:
Reduce the vulnerability of property owners in landslide-prone areas.	Protect Life and Property; Enhance Natural Systems; Encourage Partnerships for Implementation; Promote Public Awareness

Alignment with Existing Plans/Policies:
Comprehensive Plan; Development Code
2018 Status/Rationale for Proposed Action Item:
• Ongoing – no improvements to report.
Ideas for Implementation:
• Conduct a study to identify appropriate mitigation strategies for problem areas including buildings and infrastructure in the bluff area; • Develop public information to emphasize economic risk when building on potential or historical landslide areas; • Update the landslide hazard map when LIDAR data becomes available; and • Review the planning and building codes and make updates or changes to the safe harbor code, if necessary.

Coordinating Organization:	Planning

Internal Partners:	External Partners:
Public Works	Clackamas County Water Environment Services, Department of Environmental Quality

Potential Funding Sources:	Estimated cost:	Timeline:
General Fund, Environmental Fund, System Development Charge Funds	Moderate	☐ Short Term (0-2 years) X Long Term (2-4+ years) ☐ Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium Priority

Severe Weather #1

Proposed Action Item:	Alignment with Plan Goals:
Obtain funding to bury power lines subject to frequent failures to reduce power outages from the windstorm and severe winter storm hazard, where possible.	Protect Life and Property; Encourage Partnerships for Implementation

Alignment with Existing Plans/Policies:

Comprehensive Plan; Development Code

2018 Status/Rationale for Proposed Action Item:

- The Disaster Mitigation Act of 2000 requires communities to identify and analyze a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with emphasis on new and existing buildings and infrastructure [201.6(c)(3)(ii)]. Developing and implementing programs to reduce the potential for wind and winter storms to cause power outages can assist a community in mitigating its overall risk to wind and winter storms.
- Canby Utility placed utilities underground on 1st Avenue and SE 2nd street and all new development is underground. About 70% of utilities are located underground. A new substation on Knights Boulevard was built to assist with switching to have enough power transformation if the substation on 99E goes down.
- Part of a 5-year system study and update plan has been completed.

Ideas for Implementation:

- Partner with PGE to continue hazardous tree inventory and mitigation programs;
- Ensure there are back up underground lines to major businesses & employers; and
- Continue regular tree trimming practices.

Coordinating Organization:	Canby Utility

Internal Partners:	External Partners:
Public Works	PGE

Potential Funding Sources:	Estimated cost:	Timeline:
Capital Funds	Low to High	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	Existing Action Item
Priority:	Medium Priority

Wildfire #1*

Proposed Action Item:	Alignment with Plan Goals:
Coordinate wildfire mitigation action items through the Clackamas County Community Wildfire Protection Plan.	Protect Life and Property; Enhance Natural Systems; Augment Emergency Services; Encourage Partnerships & Implementation; Promote Public Awareness

Alignment with Existing Plans/Policies:
Clackamas County Community Wildfire Protection Plan (2018)
2018 Status/Rationale for Proposed Action Item:
The wildfire mitigation action items provide direction on specific activities that organizations and residents in Canby can take to reduce wildfire hazards. 2018 Status: Ongoing. CCWPP updated in 2018.
Ideas for Implementation: CCWPP Identified Focus Areas and Priority Actions
Wildfire Risk Assessment (Ch. 4): 1. Maintain and update the Fuels Reduction (FR) and Communities at Risk (CAR) maps and databases. 2. Continue to track structure vulnerability data throughout the County through structural triage assessments. 3. Update the Overall Wildfire Risk Assessment as new data becomes available. Hazardous Fuels Reduction and Biomass Utilization (Ch. 5): 1. Develop and maintain an inventory of potential and successful FR projects by meeting with parks and natural lands managers quarterly. 2. Continue securing funding to implement projects/hire seasonal ODF staff. Emergency Operations (Ch. 6): 1. Develop and FDB Communications Works Group. 2. Conduct a Conflagration Exercise. Education and Community Outreach (Ch. 7): 1. Develop Firewise toolkit for CAR's. 2. Create incentives for fuels reduction. 3. Update and distribute the Burn Permitting and Fire Restrictions Brochure. 4. Continue to improve address signage throughout the County. Structural Ignitability Policies and Programs (Ch. 8): • Identify a DTD representative for the WFEPC. • Improve coordination with Rural Fire Agencies. • Integrate WU into Plan Map and include a public outreach strategy.

Coordinating Organization:	Canby Fire District

Internal Partners:	External Partners:
Public Works, Planning	Clackamas Fire Defense Board, ODF, U.S. Forest Service, public land management agencies

Potential Funding Sources:	Estimated cost:	Timeline:
ODF, operating budgets, FEMA HMA	Low to High	☐ Short Term (0-2 years) ☐ Long Term (2-4+ years) X Ongoing

Form Submitted by:	New Action Item
Priority:	High Priority (*CCWPP identified priority actions listed above*)

** - High Priority Action Item*

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ATTACHMENT B:
PUBLIC INVOLVEMENT SUMMARY

Members of the HMAC provided edits and updates to the NHMP prior to the public review period as reflected in the final document.

To provide the public information regarding the draft NHMP addendum, and provide an opportunity for comment, an announcement (see text below) was announced on the city's website and an email contact was provided for public comment.

During the public review period there were XX comments provided.

Press Release

To be provided.

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